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ABSTRACT

The four sections of the report cover the topics of cataloging, subject analysis, documentation systems for industry and the Documentation Research and Training Centre (DRTC) research report for 1970. The cataloging section covers the conflicts of cataloging, recall, corporate bodies, titles, publishers series and the entity name. The subject analysis section covers the formulation of basic subjects and isolates; compares "subject" with "system," compares natural and social sciences, and a case study. Management needs for information; management information systems; and information needs for design engineers; and food, glass, ceramics, and textiles industry needs are covered in the third section and several case studies are provided. The research report section includes classification, cataloging, and computer-aided document finding system research. (AB)

DOCUMENTATION RESEARCH AND TRAINING CENTRE (=DRTC)

112, Cross Road 11, Malleswaram, Bangalore 3

1 OBJECTIVES

The Documentation Research and Training Centre, established in 1962 by the Indian Statistical Institute, has the following objectives :

1 To do and to promote continuing research in documentation ;
2 To give a course of training in documentation ; and
3 To do consultant service in documentation.

2 THE COURSE

The course offers comprehensive instruction in the theory and practice of documentation. It places emphasis on imparting theoretical knowledge of a high order and at the same time on equipping the student with the necessary professional competence based on practical experience. Instruction is largely individual. Tutorials, small group discussions, and weekly colloquia are organised so as to develop in the students the capacity for systematic thinking and for clear exposition.

In the observational study period, the trainees are given an opportunity to visit and observe the working of specialist libraries, industrial units, and research laboratories. They are also given practical working knowledge of document finding with mechanical aids such as Punched Cards and Computer. They also receive instruction and experience in the organisation and managerial aspects of reprography and translation work.

21 Annual Seminar

The Annual Seminar, turned on some specific area of documentation, forms an integral part of the course.

22 Hostel

To make this participative work possible, the DRTC is made a residential institution. Living in the hostel attached to it is obligatory.

3 SUBJECTS OF STUDY

Group 1

1 Universe of subjects : its development and structure :
2 Depth classification (Theory);
3 Depth classification (Practice);
4 Library catalogue.

Group 2

5 Documentation :
6 Management of specialist library
7 (i) Mechanised document finding systems ;
  (ii) Elements of statistical analysis ;
8 A project in documentation.

Group 3

9 A project consisting of the survey of the trend in current research in a specific subject.
10 Observational study.

31 Project 1

The project in documentation, to be completed during the formal course in DRTC, consists of the preparation of a documentation list by each student on a specific subject. The work involves scanning and selecting articles from an approved set of periodicals relevant to the subject, minutely classifying the documents, preparation of abstracts of the documents, and preparation of the necessary added entries.

A Depth Schedule for the classification of the subjects covered by the documentation list is also to be worked out simultaneously for the minute classification of the documents.

Continued on page 3 of the cover

DRTC Annual Seminar

1 ; 1963 : Documentation Periodicals : Coverage, Arrangement, Scatter, Seepage, and Compilation. Not Available

2 ; 1964 : Document Retrieval : Classification.

3 ; 1965 : Depth Classification : Subject Heading. OP

4 ; 1966 : Universe of knowledge ; Depth Classification ; Documentation List. OP

5 ; 1967 : Developments in Classification ; Management of Reprography Service ; Subject Headings and Feature Headings.

6 ; 1968 : Theory and Practice of Abstracting ; Developments in Classification ; Teaching Techniques in Documentation.

7 ; 1969 : Subject Analysis for Document Retrieval System ; Quantification and Librametric Studies ; Management of Translation Service.

8 ; 1970 : Library Cataloguing : Rendering of Names of Corporate Bodies. Subject Analysis, with Special Reference to Social Sciences. Documentation Systems for Industry.

DRTC Mid-Year Seminar

1 ; 1970 : Seminar on Cataloguing.

OTHER RECENT REPRINTS :

1 RANGANATHAN (S R). Colon classification. Ed 7 (1971) : A preview. 1969. 52 P.

2 RANGANATHAN (S R) and BHATTACHARYYA (G). Conflict of authorship: Corporate Body *vs* Corporate Body. 1970. 65 P.

3 BHATTACHARYYA (G). Cataloguing research in India. 1969. 85 P.

4 NEELAMEGHAN (A) and SANGAMESWARAN (S V). Food Technology : Depth version of CC. 1970. 82 P.

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ANNUAL SEMINAR

8

RENDERING OF NAMES OF CORPORATE BODIES ; SUBJECT ANALYSIS, WITH SPECIAL REFERENCE TO SOCIAL SCIENCES ; DOCUMENTATION SYSTEMS FOR INDUSTRY

(8th Annual Seminar).

PART 1 : PAPERS.

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DRTC Seminar (8)(1970). Paper AA.

CONFLICT OF CANONS OF CATALOGUING.

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An examination is made of the cases in which conflict arises between the Canons of Ascertainability, Prepotence, and Recall Value, in their application to the determination of the Entry Element in the heading of a Catalogue Entry. Canon of Prepotence, and not of Ascertainability, should determine the Entry Element in a Name-of-Person. The application of the Canon of Prepotence involves statistical analysis. Such an analysis was done in respect of Asian names in 1953 on the request of the Committee on Bibliography of Unesco. In the case of a Name-of-an-Organ of a Government, it is difficult to use the Canon of Prepotence; but the Canon of Recall Value is of help. In the case of a Name-of-Institution and a Name-of-Conference also the Canon of Prepotence fails. Further, the Canon of Recall Value also has difficulties. Its difficulties are analysed into six categories. A prescription is made in respect of the first five categories. But in the residual sixth category, it fails, and the Canon of Ascertainability takes over. Wherever the Canon of Recall Value is applicable, the range of search in the Catalogue Entries is considerably reduced.

1 STATEMENT OF THE CANONS CAUSING CONFLICT

The canons of Ascertainability, Prepotence, and of Recall Value sometimes present conflict with one another. These Canons are stated in the following sub-sections.

11 Canon of Ascertainability

The principle that the information found in the title-page of the document catalogued and its overflow pages should determine the choice of

1 Each Section of the Main Entry other than the Extract Note, the Extraction Note, and the Related Book Note;

2 Each Section of a Cross Reference Entry (in a Classified Catalogue) and Subject Analytical (in a Dictionary Catalogue) other than the Leading Section and the Directing Section;

3 The Heading of each Book Index Entry other than any derived from the Extract Note, Extraction Note, and Related Book Note;

4 All Sections other than the Heading and Directing Section of each Book Index Entry;

5 All Sections other than the Heading and Directing Section of a Class Index Entry (in a Classified Catalogue), and Specific Subject Entry, and See also Entry (in a Dictionary Catalogue);

6 Each Section other than the Directing Section in each Cross Reference Index Entry other than the Alternative Name Entry, Variant-Form-of-Word Entry, and Generic-Name Entry; and

7 Similar sections in any other kind of entry (2).

Note.- Category 6 is under re-examination.

12 Canon of Prepotence

The principle that

1 The Potency to decide the position of an Entry among the various entries in a catalogue should, if possible, be concentrated totally in the Leading Section; and even there

2 It should be concentrated, as much as possible, in the Entry Element; and further

3 If total concentration in the Leading Section is not possible, the minimum possible potency should be allowed to over-flow beyond it to later sections; and

4 Even this spill-over should be distributed in the later sections in a decreasing sequence of intensity (3).

13 Canon of Recall Value

The principle that in a multi-worded name of a person, an institution, a conference, or an organ of a Government or of an institution or of a conference, and of a multi-worded title of a document other than a periodical publication, the Entry Word or Word-Group in the Heading of the Main Entry should be the one with the highest Recall Value (5).

2 ASCERTAINABILITY vs PREPOTENCE

A cataloguer in the British Museum Library had once entered my books under the heading "Shiyali Ramamrita Ranganathan". He had found somewhere the expansion of the initials "S" and "R". He told me that he could not "ascertain" the correct Entry Word in my name and that he, therefore, treated the name as a three worded one, and made the heading accordingly. Here, he correctly interpreted the Canon of Ascertainability, in so far as he took the name of the author from the title-page. But he had overlooked the fact that the title-page had contracted the first two words in the name into their initials, in order to mark out the word 'Ranganathan' as the Prepotent word in the name. He expanded the initials and created trouble for himself, as he was not sure which word represented the family name. For, he was accustommed to using the family name as the Entry Element in the case of the authors of most of the books in that library, who all belonged to the West.

The correct way of determining the Entry Element is a statistical one. In western names, the number of words available for use as the family name is greater than those available for use as the personal name. The family name has, therefore, greater potency than the personal name, and therefore, it should be the Entry Element. But the relative numerousness of the two groups of words varies with the cultural group in which the Name-of-Person occurs. There is no means for a cataloguer to know this relative numerousness in the case of names belonging to cultural groups other than his. It is for this reason that the Second Conference held in Delhi on 14 March 1951 of the Indian National Commission for Unesco recommended to the Conference of the National Commissions to be held at Bangkok in 1951, that the Unesco Bibliographical Committee should investigate the problem for Asian Names. The Unesco's Provisional International Committee on Bibliography and Documentation, assigned the investigation of this problem to India by a resolution passed at its Meeting, held in Paris from 21 to 25 April 1952. On 12 May 1952, the Indian Library Association assigned this to me. My Report was despatched to Unesco on 31 October 1953 (4). As a result of the conservatism and perhaps of allergy to statistical investigation, the seniors in the Unesco Bibliographical Committee finally buried this Report.

Perhaps the mistake done by the British Museum Library Cataloguer was due to his assumption that the Canon of Ascertainability should govern also the sequence of the words in the name of an author, belonging to cultures other than that of the West. The Canon of Prepotence had not occurred to him in determining the Entry Word in a Name-of-Person. Thus, this conflict was resolved by him in the wrong way. It may also be added here that the Canons of Recall Value and of Prepotence agree with each other in this matter.

3 PREPOTENCE : NAME-OF-PERSON

The Canon of Prepotence allied to statistics should be said to have scored a fair amount of success in determining the Entry Element in a Name-of-Person.

4 PREPOTENCE : NAME-OF-GOVERNMENT

In the case of a Corporate Author, the Canon of Prepotence has not proved a success. It is particularly so in respect of the name of the second and later headings in the Name-of- Governmental Author. These are usually Name of a Ministry or a Department, or a Commission, or any other similar body. Let us take "Department of Education" as an example. Is "Department" the prepotent word, or is it "Education"? The word 'Department' will certainly occur in connection with every subject. Similarly, the word 'Education' also may occur in connection with all kinds of Governmental organisations, which are denoted by several words, such as Board, Bureau, Department, etc. One group of words denotes the names given to Organisations, and the other group of words denotes the names given to the Subjects of jurisdiction. No statistical investigation has been made to help the Canon of Prepotence in selecting with certitude either of the two kinds of words, as the Entry Element. Such an investigation will be more arduous and complex than it has been in respect of Name-of-Persons.

41 Prescription by AACR

The following Rule of AACR (1967) determines the issue:

"78B.- If the body is not one of the types listed in [78A], or if there is doubt that it is one, enter it as a subheading under the heading for the Government." This Rule does not state how the subheadings should be entered -- in other words, which word in the name should be treated as Entry Element. But the following examples given under this Rule imply that the first word in the name should be the Entry Element:

1 Great Britain. Dept. of Scientific and Industrial Research.

2 Italy. Ministero della Cultura Populare.

3 U.S. Copyright Office.

4 U.S. Dept. of Commerce.

5 U.S. Housing and Home Finance Agency.

42 Prescription by CCC

The following Rule of CCC (1964) determines the issue:

"JC6 Administrative Department.

"The Entry Element in the name of an Administrative Department of a Government is to be the Word or Word-Group denoting its sphere of work." According to this Rule, the examples given in Sec 41 will get changed as follows:

1 GREAT BRITAIN, SCIENTIFIC AND INDUSTRIAL RESEARCH (Department of —)

2 ITALY, CULTURA POPULARE (Ministero della —)

3 UNITED STATES OF AMERICA, COPYRIGHT (— Office)

4 UNITED STATES OF AMERICA, COMMERCE (Department of —)

5 UNITED STATES OF AMERICA, HOUSING AND HOME FINANCE (— Agency)

43 Recall Value Takes Over

There is no reason given in CCC for its choice, as Entry Element, of the "Word or Word-Group denoting its Sphere of Work". Perhaps, the Canon of Recall Value was guiding the decision from the trans-conscious level, though it had not been formulated till 1969.

This implies that CCC prefers Recall Value to Prepotence in this case.

44 Law of Least Action Takes Over

But AACR evades the issue. It may be taken to have chosen the Law of Least (Intellectual) Action as the guiding principle for determining the issue.

5 NAME OF INSTITUTION

50 Additional Difficulties

To a cataloguer a Name-of-Institution presents many more difficulties than a Name-of-Person, or a Name-of-Government and of its Departments. These are different from deliberate change of name and homonym, which are common to all kinds of names -- whether of Institution or of any other category. The additional difficulties in a Name-of-Institution are due to the following causes:

1 The Institution being named differently in different alternative title pages of one and the same publication;

2 The Institution being named in different languages in different alternative title pages or even in one and the same title page of one and the same publication; and

3 Unintended change in a Name-of-Institution occurring in the title pages of its different publications.

The last is the result of the name of the publication being put down on the title pages of its publications by different persons who prepare them. As the Institution itself has no memory, it often happens that the persons responsible for its publications take the liberty of changing its Name listlessly or unintentionally.

51 Canon of Ascertainability

For the application of the Canon of Ascertainability, definite rules are given in Cataloguing Codes about the Name-of-Institution to be chosen for the heading of an Entry in cases 1 and 2. In case 3, the Canon of Ascertainability has to be slighted as it were. The Name-of-Institution should be uniformised. It is the uniformised name that is usually prescribed for use in the heading of an Entry. Thus, the function of the Canon of Ascertainability is concerned only with the choice of one and the same name of one and the same Institution. It does not help us in determining the Entry Element.

52 Prescription in Catalogue Codes

But the Catalogue Codes generally prescribe the use of the entire chosen Name-of-Institution, as Entry Element, the words in it being written in the same sequence as that found on the title page or in the uniformised name.

53 Prepotence

But the initial word in a Name-of-Institution is often insignificant and does not stick to the memory of a reader. Further, no attempt has been made to make a statistical study of Name-of-Institutions and arrive at any guidance to select the prepotent word as the Entry Element, and to treat the other words in the name as forming the Secondary Elements. Perhaps, such a statistical study is not practicable. As a result, the Canon of Prepotence fails in the Choice of the Entry Element in the Name-of-Institution.

54 Futility of the Existing Rules

All the same, it cannot be denied that the prescription of the existing Rules for the Rendering of a Name-of-Institution is futile. It is strange that CCC, which has prescribed a helpful Rule in determining the Entry Element in the Name of a Department of Government, has failed to do so in the case of a Name-of-Institution. The reason is that in the former case, CCC has been guided by the Canon of Recall Value, working from the trans-conscious level. If this canon had been available at the conscious level, CCC would not have made this mistake.

55 Canon of Recall Value

After the Canon of Recall Value was brought up to the conscious level and formulated, in 1969, it has driven out the Canon of Ascertainability from the field and provided the framers of Catalogue Codes with a definite guide. And yet, the implementation of the Canon of Recall Value bristles with many difficulties, in determining the Entry Element in a Name-of-Institution. Probably this is one reason why the help of Canon of Recall Value working from the trans-conscious level was not taken. These difficulties were analysed and laid bare at the DRTC Seminar on

Cataloguing (Bangalore)(1970) into six categories (1). They are mentioned below with examples under each category:

1 The word or word-group indicating a Subject forming the purview of the Whole Institution;

Example:

ART (— Society of India)
GEOGRAPHY (—cal Society of India)
SCIENCE (Indian Institute of —)

2 The word or word-group indicating a Class of Persons or a Class of Corporate Bodies forming the purview of the Whole Institution;

Example:

TAMIL WRITER (—s Association)
SCIENTIFIC UNION (Internation Council of —)

3 The word or word-group indicating the nature of research or investigation -- such as Advanced Studies, Fundamental Research, and Applied Research -- forming the purview of the Whole Institution;

Example:

ADVANCED STUDY (Institute of —ies)

4 The word or word-group indicating the Corporate Nature of the body cum its dominant traditional Sphere of Work -- such as, University, College, School, Laboratory, Library, and Museum;

Example:

LABORATORY (Regional Research —)
LIBRARY (Delhi Public —)
HOSPITAL (K C General —)
OBSERVATORY (Royal Greenwich —)
CHURCH (Third English Lutheran —)
MUSEUM (Liverpool City —)

5 Fanciful word or word-group, such as a Name-of-Person not forming the subject or the purview of the Whole Institution, if any;

Example:

SIGMA XI (Society of —)

6 Name of the Institution as a whole in the case of a name not admitting a word or word-group of the kind mentioned in categories 1 to 5 above.

Example:

ATHENAEUM OF OHIO
BRITISH COUNCIL
CHANNEL ISLANDS FIELD STATION
DUKE FOUNDATION
HARVEIAN SOCIETY OF LONDON

551 Reaching Upto Doormat

In respect of Category 4 mentioned in Sec 55, CCC had reached upto the doormat, as it were, but failed to go further. For, it has recognised in its Rule LF1 that the Recall Value of Category 4 mentioned in Sec 55. Indeed, the Rule reads:

"Corresponding to a Book Index Entry or a Class Index Entry with the name of an Institution or of a Conference as the Heading, there is to be a Generic Name Entry using as Heading the appropriate Generic Term, such as "Botanical Garden", "College", "Conference", "Laboratory", "Library", "Museum", "School", "University", and "Zoological Garden"."

The intensity of the Canon of Recall Value at the trans-conscious level was evidently of a low order. But, it has now been brought to the conscious level, and its intensity is in full measure.

56 Conflict Among the Categories in Respect of Recall Value

Sometimes it happens that two or more of the first five categories mentioned in Sec 55, come into conflict. To resolve this conflict, the Seminar has prescribed that, that element among the conflict elements, which occurs earlier in the list, is to be preferred.

Example:

WOMEN (Lady Shri Ram College for —)
and not
COLLEGE (Lady Shri Ram -- for Women)

AFRICANA (— Museum)
and not
MUSEUM (Africana —)

ZOOLOGY (Museum of —)
and not
MUSEUM (— of Zoology)

In the examples given above, it will be found that a dash should represent the Entry Element in the Secondary Element contained within the brackets, even if it is a word in the nominative case, singular form, in contradiction to the Seminar decision that the dash is not necessary in such a case.

57 Advantage of the Prescription in Sec 55

The advantage of the prescription given in Sec 55, in accordance with the Canon of Recall Value, is that the range of search for the Name-of-Institution is reduced to a minimum in the alphabetical part of a Classified Catalogue and in a Dictionary Catalogue. But for this, such search will have to be made in many cases from A to Z.

58 Amendment to CCC

It is proposed to incorporate the substance of Sec 55 and 56 in the Rules of Ed 6 of CCC.

6 NAME-OF-CONFERENCE

The problems arising in the determination of the Entry Element in a Name-of-Conference and their solution are similar to those for a Name-of-Institution.

7 PROBLEMS FOR RESEARCH

The prescription for Category in Sec 55 should not be taken as the last word in the subject. It merely follows the technique of rounding off a subject when nothing better is available. But, this rounding off should not be taken to be permanent. Fresh light should be turned on it by continuing research.

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5 Sec 13 --. Recall value and entry word in heading. (Lib sc. 6;1969;Paper Q).

21 0

DRTC Seminar (8)(1970). Paper AB.

BASIS FOR THE CANON OF RECALL VALUE.

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The efficiency of the catalogue's response to the approach of a reader is to be considered primarily in relation to the capacity of his memory in recalling a name encountered by him at least once. The factors that detract a normal reader from recalling all the words in their sequence in the multiworded name of an entity are: (1) The increase in the variety and number of such entities; (2) The growing tendency of multiwordedness of names of such entities; and (3) The incidence of near homonymous and alternative names of such entities. Due to the above factors, the proportion of cases in which a multiworded name may be recalled correctly is decreasing. One approach to a solution may take the form of provision of cues in the catalogue that can aid the reader in calling back to memory the different components in the name and identify it correctly, starting from one or a few of the words in the name. Such a cue has to be a word or word-group having the highest Recall-Value -- that is, the potency of being called-back to memory by the majority of the readers. In relation to a particular reader, a name of subject correlating with his field of interest may form such a cue. The above findings about the deep psychology of human memory, learning, and recall have led to the formulation of the Canon of Recall-Value. It is the principle that in the multi-worded name of an entity, the Entry Element is to consist of the word or word-group with the highest Recall-Value.

1 LIBRARY SERVICE AND THE LAWS OF LIBRARY SCIENCE

The objective of library service can be conveniently derived on the basis of the Five Laws of Library Science (19). It is the

1 Bringing into use documents by readers (Law 1);

2 Pinpointedly (Law 2);

3 Exhaustively (Law 3);

4 Expeditiously at optimum cost (Law 4);

5 In the context of a rapidly changing universe of subjects and requirements of readers (Law 5).

2 LIBRARY TOOLS AND TECHNIQUES

Several library tools and techniques have been developed for the purpose of achieving the above-mentioned objective. The library catalogue is one such basic tool. The methodology for the design and development of this tool has evolved over three centuries now (3). From a rule of thumb, trial and error method, the design of library catalogue can now be based on a set of guiding principles -- the Canons of Cataloguing (14). The practice of cataloguing is guided by specific codes and rules formulated to conform to the canons. The canons, principles, codes and rules as a whole are formulated so as to conform to a more comprehensive set of normative principles -- the Laws of Library Science and the General Normative Principles (15).

3 FUNCTION OF LIBRARY CATALOGUE

31 Selection of Document

The function of library catalogue formulated with a view to aiding the achievement of the objective of library service may be stated briefly as follows:

To help the reader

1 Getting to the entries of documents relevant to his interest at the moment, taking into account that he may search for and select documents by the name of any one or more elements -- such as, name of subject, author, collaborator, title, and series of the documents; and

2 In the choice of the most relevant documents, if there are several of them of likely interest, on the basis of the details given in the catalogue entry.

32 Catalogue's Response and Psychology of Memory

The efficiency of the catalogue's response to the approach of the reader is to be considered in relation to certain attributes of the psychology of the 'normal' reader -- particularly the capacity of memory in recalling a name encountered at least once by him. The following situations can be considered:

The reader recalling -- that is, remembering and being able to state

1 The words in the name of a cataloguing element in their correct sequence, say, as they occur in the title-page of a document he had used;

2 Only one or more but not all the words in

the name of the cataloguing element;

3 An alternate word for a component in the name of the cataloguing element;

4 An alternate name of the cataloguing element as a whole; and

5 The words in the name of another element instead of or in addition to, those in the name of the element he may be concerned at the moment.

33 Scope of the Paper

This paper discusses the basis for the formulation of the Canon of Recall Value (20). The discussion will largely be concerned with name of corporate body. However, the findings are almost equally valid in respect of the name of Series and of Work (Title of document).

4 PROBLEM OF CORRECT RECALL

41 Factors Affecting Recall

The factors that detract the normal reader from recalling all the words in the sequence in which they occur in the name of a corporate body include the following:

1 Increase in the variety of corporate bodies;

2 Increase in the number of corporate authorship;

3 Near-homonymous names;

4 Growing tendency of multiwordness of names of corporate bodies; and

5 Alternative names (synonym).

42 Increase in the Variety of Corporate Bodies

A corporate body is defined as a number of persons taken collectively usually as united, or organised, or coming together informally in a common cause or for common action (5). "Government", "Institution", and "Conference" are conventionally the well known kinds of corporate bodies. But, in recent years new kinds of corporate bodies have come up. For example, the Near-Sovereign body. Prior to World War I, there were hardly any Near-Sovereign bodies producing documents. After the League of Nations, and more particularly, during the last two decades, the number of such bodies has increased. Concern with regional and global problems of mutual interest -- such as, security, economy, and cooperation -- among the nations has been one of the reasons for the formation of such bodies.

Example

1 United Nations
2 Central Treaty Organisation (CENTO)
3 North Atlantic Treaty Organisation (NATO)
4 Organisation of American States (OAS)
5 Organisation of African Unity (OAU)
6 Council of Europe

A meeting of persons for discussion, or deliberation, or learning, or practice has, in recent years, been given differentiated names -- such as, Colloquium, Tutorial, Seminar, and Workshop.

Also, such names as Project, Programme, Task Force, and Consultants are comparatively new comers in the field.

All these add to the cataloguing problems and difficulties of recall of correct name by the reader.

43 Increase in the Number of Croporate Bodies

The complexity and interdisciplinary character of present day research and developmental activity requires the sponsorship, active support, and financing by corporate bodies. An increasingly larger number of corporate bodies are being formed to promote education, research, and professional activity in an increasingly larger number of specialised fields. The growing involvement of governments and industrial enterprises in such promotional activities is a noteworthy feature of recent decades.

On the basis of a recent survey of research institutions in the natural sciences in India, Rajagopalan reports as follows: "There are 27 institutions established before 1900. Between 1900 and 1946, 209 institutions came into being. After Independence, there has been a steady increase in the number of institutions. On an average, about 30 new institutions are being added every year" (13).

During the 75-year period 1870-1945, five international organisations in the social sciences came into existence. Compared with that nine more such organisations were established in the 15-year period 1945-1960.

Data based on a count of the learned bodies listed in the World of learning (WL) are given below:

431 Table 1. Number of Learned Bodies

Year	Number of learned bodies listed in WL
1965-6	16,700
1969-70	23,500

Thus, the average increase in the number of learned bodies per year is about 1,700 during the four-year period, 1965-9.

432 Increase in Corporate Authorship

Ahuja and others (1) in a study of the incidence of the various kinds of authorship of books, have shown that there is a definite trend of increasing corporate authorship in the fields of science and technology, and social sciences.

44 Near-Homonymous Name

There is a multiplicity of corporate bodies in one and the same or very closely related subject fields. This may happen even in one and the same country. Consider for example, the following institutions in India:

National Institute of Social Sciences

Institute of Social Sciences
Tata Institute of Social Sciences
Delhi School of Social Work
University Institute of Social Sciences

The field of work or of concern of each of these institutions is similar, if not the same. If two or more institutions have the same subject in their purview, usually the differentiation in name is made using a different word indicative of "corporate nature" (Institute, Association, Centre etc), or indicative of area of purview ('national', 'international', 'regional', or name of particular place) or name of founder, sponsor etc; or a change of term indicating a corporate body -- for example, Seminar, Workshop, Institute etc (See Sec 42), or in some cases, it is merely a permutation of the same words. To the reader these inconsequential differentiations are difficult to remember correctly. Therefore, he may confuse the name of one corporate body with that for another.

45 Growing Multiwordedness of Names

There was a time when the number of corporate bodies was small, and the name of some of them contained only one word -- just as it was in the early Names-of-Person -- and that was sufficient to distinguish one corporate body from another. Example: Academy, Athenaeum. But with the increasing number of corporate bodies and each vying with the other to have a distinct and even "expressive" name of its own, there is a growing tendency for multi-wordedness of Name-of-Corporate Body. Terms indicative of specific subject, geographical area of purview, place of location, nature of the corporation etc, are combined and permuted to form distinctive names. Further, each idea-component in the name -- such as, a subject -- may have to be represented by two or more words. Generally, the more the number of words in a name the more difficult it is to remember all the words in the correct sequence. This is the finding of studies in the psychology of learning and of memory (12). Data on the average number of substantive words in the names of corporate bodies based on a study of over 1200 such names, given in the World of learning (1969-70), are presented in the following table.

451 Table 2. Number of Substantive Words in the Name of Corporate Bodies

(Total Number of Names examined: 1212)

SN	Period	Total	Corporate Name with			
			Not more than 3 substantive words		4 or more substantive words	
			N	percentage	N	percentage
1	1900-09	100	48	48	52	52
2	1910-19	144	78	54	66	46
3	1920-29	179	84	47	95	53
4	1930-39	164	96	59	68	41
5	1940-49	191	89	47	102	53
6	1950-59	274	101	37	173	63
7	1960-69	170	67	39	103	61

It may be noted that during the last three decades, 1940 to 1969, the percentage of names with 1 to 3 words has decreased, whereas that for names with 4 words and above has increased.

46 Alternative Name

A reader may use one or more alternative names for a corporate body. These may be of the following kinds:

1 A known alternative name, both names being in use currently.

Example:

1 'Jayakar Library' for 'Poona University Library'

2 'Ratan Tata Library' for 'Library of the Delhi School of Economics'

2 Abbreviated name

21 Generall accepted

Example:

1 ISO = International Standards Organisation

2 FID = International Federation for Documentation

22 Coined by reader

Note.- In some cases, two or more corporate bodies may get the same abbreviated name. For example, ISI may denote either 'Indian Standards Institution', or 'Indian Statistical Institute' or 'Institute of Scientific Information'. Such abbreviations can be an additional source of trouble.

3 Name, usually short and used in a small,

private circle.

Example:

1 Elsinore Conference (among librarians)
= International Conference on Classification and Information Retrieval (Elsinore)(1964).

2 'Science Congress' (among Indian scientists)
= Indian Science Congress

3 'Tata Institute' (in Bangalore)
= Indian Institute of Science

4 Use of old name when the name of the corporate body has been changed

Example:

1 'American Documentation Institute' for 'American Society for Information Sciences'

2 'Western Reserve University' for 'Case-Western Reserve University'

47 Variation in the form of Citation

A reader may get the name of a corporate body from different sources, such as the following:

1 Cited in a bibliography;
2 Referred to in the text of a document; and
3 Information given by another person.

In each of these cases, there may be variations in the form in which the name of the corporate body is cited. Thus, even one and the same name may be cited in different ways in different sources.

48 Variation in Title Page Name

Difficulty may also arise due to the name of a corporate body being mentioned with different degrees of variation in the title page of documents. For example,

1 The corporate body being named differently in different title pages of one and the same publication;

2 The corporate body being named in different languages in different alternative title pages or even in one and the same title page of one and the same document; and

3 Unintended change in the name of the corporate body occurring in the title page of different documents.

5 LIKELY FUTURE CONTEXT

Past and present experiences indicate that the kind of problems mentioned in Sec 4 and its subdivisions are likely to increase in number and, perhaps, in complexity also. New kinds of problems may come up. The human brain, on the other hand, is not evolving fast enough, if at all, to meet this problem (8, 21). This implies that

1 The proportion of cases in which the name of corporate body may be recalled correctly -- that is, all the terms in it in the exact sequence, say, as given in the title page of a document -- will decrease; and

2 The proportion of cases in which the name of

corporate body will be recalled incorrectly, due to the factors mentioned in Sec 4 and its subdivisions, will increase.

6 SOLUTION

61 Demand of the Canon of Context

The Canon of Context (16) demands the development of a solution to the situation mentioned in Sec 5 such that the utility of the library catalogue as an efficient tool in providing a library service in conformity with the norms set by the Five Laws of Library Science is not diminished.

62 Provision of Cue

Sir Frederick Bartlett writes "Remembering is not the reexcitation of innumerable fixed, lifeless and fragmentary traces. It is an imaginative reconstruction, or construction built out of the relation of our attitude towards a whole active mass of organised past reactions or experience, and to a little outstanding detail which commonly appears in image or in language form. It is thus hardly ever really exact even in the most rudimentary cases of rote recapitulation, and it is not at all important that it should be so" (2). Thus, one approach to the solution could be the provision of external aids to memory, to make the recall of names more efficient. This may take the form of provision of cues in the catalogue that can aid the reader in calling back to memory the different components in the name and identify it correctly, starting from a memory of only one or a few of the words in the name.

63 Psychology of Memory

The strategy mentioned in Sec 62 has the support of the findings of the psychology of memory. Vannevar Bush writing about his "Memex" machine just a quarter of a century ago said:

> "It [human mind] operates by Association. With one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts, in accordance with some intricate web of trails carried by the cells of the brain" (4).

The "black box" theory of learning also lends support:

> "The basis is that in a learning situation, a subject (reader) develops an abstract representation of his environment (a 'black box') which enables him to focus attention upon and store and process information about environmental features which are relevant to the specific task on hand. A black box is characterised by a set of 'environmental cues' which assume particular values at discrete time-intervals (trials) and an 'output register' which specifies a reinforced (correct) response at each interval" (7).

64 Feedback

Thus, an appropriate cue could be an aid by which the reader can move from one entry to another in a sequence which at each step feeds back to him some information whether he is getting nearer or not to the name of the entity he is looking for. Further, the arrangement and display of the entries should be such that the reader is enabled to recognise the name of the particular corporate body body in which he is interested at the moment within as short a range of search as possible. This process has similarity to that of finding an appropriate name for an idea one has in mind using a thesaurus, such as the Roget's Thesaurus.

65 Association, Reinforcement, and Recall

The discussion in Sec 63 and 64 leads to the inference that

1 From among the components constituting the name of a corporate body it is possible to choose the name (word or word-group) of one or two components for use as the cue to aid the reader; and

2 This word or word-group is likely to be remembered and used by the majority of readers as the entry point for search in the catalogue to get at the name of the corporate body they may be interested in at the moment.

Psychology of learning, remembering, and recalling points out that this word or word-group should denote an idea (stimulus) with which the reader is closely and frequently associated. The frequent association provides the reinforcement helpful in learning and remembering. Thus, "Other things being equal, the efficiency of recall and relearning depend upon how long a time elapses between the learning phase(s) and subsequent recall. Generally speaking, the longer the interval, the less efficient recall will be" (12).

66 Reader's Association

Based on these psychological attributes -- that is, of memory, association, remembering and recall -- it is conjectured that among the terms used in naming a corporate body there is relatively higher probability of the reader calling back to memory that term denoting an idea with which he is usually frequently associated or concerned. For example, a reader may be said to be comparatively more frequently concerned with a subject of his interest. This may happen through his work, reading, teaching, discussion with colleagues etc. Therefore, the term denoting the subject of his interest could then be the term with a comparatively high probability of being remembered and called back to memory by the reader, from among the terms constituting the name of corporate body, title, name of series etc.

Consider, for example, the following names of corporate bodies:

1 Institute of Physics
2 American Institute of Physics
3 Physical Society
4 Association of Physicists of Eastern Europe
5 International Congress of Physicists

The majority of the users of the documents produced by these bodies will be specialists in the field of "Physics". Thus, in the name of the corporate bodies mentioned above, the correlates to their normal, dominant field of specialisation are ideas denoted by the term 'Physics' and 'Physicists' and not the ideas denoted by any of the terms 'Institute' or 'Association', or 'Congress', or 'International' or 'American'. Thus, we say that the term having the highest potency of being called back to memory by a majority of the users of the documents produced by the corporate bodies mentioned above is 'Physics' in the case of the names 1 to 3, and 'Physicist' in the case of the names 4 and 5.

Experiments in the learning process and remembering indicate that "words are remembered as ideas and not as literal collection of words". The material moves from the short term memory to the long-term one by a process of recording from the names of the items to their meanings, that is, probably a semantic coding. The short term memory can probably hold from four to six unrelated items without decay, but beyond that number, some kind of "rehearsal" (reinforcement) is needed to prevent loss (6, 11). In general, that idea forming a part of one's life experience is likely to be recalled with greater facility than one that is not (8).

67 Stable Element

In the examples of the names of corporate bodies mentioned in Section 66, it is worth noting that the sphere of activity or field of specialisation, is likely to be the more 'consistent element'. That is, the name of this element is likely to be the same in the name of different corporate bodies having the same field of purview. On the other hand, terms denoting corporate nature etc are more liable to change and may be chosen from a wide range of synonyms, near-synonyms and other words. In a multiworded name these properties -- consistency and stability -- are also useful in determining the term in which the relative potency of a word or word-group of being called back to memory may rest.

68 Formulation of a Normative Principle

The search for a solution to the problems mentioned in Sec 4 and its subdivisions, has led to the formulation of a new normative principle for cataloguing based on the deep psychology of human memory, learning, and recall. This is the Canon of Recall Value (20). Its enunciation is given in Sec 72.

7 CANON OF RECALL VALUE

71 Recall Value: Definition

The term 'Recall Value' may be defined as the relative potency of a word or word-group for being called back to memory by a majority of readers, among the group of words constituting the multiworded name of an element in an entry in a catalogue.

72 Canon of Recall Value

The Canon of Recall Value may be formulated as follows:

The principle that

1 In the multi-worded name of
11 A person, or
12 A Corporate Body, or
13 An Organ of a Corporate Body, or
14 A Series, or
15 A Work (that is, Title of a document),

the Entry Element is to consist of the Word or Word-group with the highest Recall Value.

8 APPLICATION OF THE CANON OF RECALL VALUE

81 Help to the Majority of Readers

The choice of the Entry Element according to the Canon of Recall Value

1 Gives positive help to the readers , already large in number and becoming even larger in number, who may remember only sone terms in the name of the corporate body; and

2 Does not fail to serve the readers, already few and becoming even fewer in number, who may remember all the terms in the corredt sequence in the name of corporate body.

82 Supporting Experimental Evidence

Some of the results of the experiments carried out by the University of Chicago Graduate Library School on the potency of recall by readers, the different bibliographical elements and other attributes of a book and their relative helpfulness in finding the correct entry for any particular book subsequently, support the choice of the Entry Element in the names of corporate bodies according to the Canon of Recall Value (10).

83 Requirement of Minority

In considering the Recall Value of each of the terms in the name of a corporate body, a global view is to be taken. That is, all the potential users in all countries and not only the present users but also those of the future, who may seek documents produced by the corporate body. The Canon of Recall Value cuts across space and time limitations of the catalogue's usefulness. In Sec 46, the possibility of use of alternative names of a corporate body has been indicated. The number of such alternative approaches will be comparatively fewer when entries are made according to the Canon of Recall Value. Even then the catalogue should satisfy the minority approach. Making necessary entries in conformity with the Law of Local Variation (17) and the provision of Cross Reference Index Entries (18) would be helpful in such cases.

84 Catalogue Efficiency and Guidance to Reader

The library catalogue is a tool developed by the librarian to help finding the documents required by readers. The reader cannot be expected to be familiar with the complexities of its design and use. True, it is an old tool. But, its users are not the same. They change. Further, to maintain maximum productivity in library service in conformity with the demands of the Laws of Library Science in the face of an ever-dynamic universe of documents, the library tools have to be kept continuously sharpened. The library catalogue is, therefore, becoming increasingly more sophisticated. As a result, productivity in the use of the library catalogue, as in the case of the every other tool and technique of the library, depends on the extent of familiarity that the reader develops with its make up and structure. It is now well accepted that the increasing complexity of the universe of documents demands an increasing involvement and participation of the reader, to make document finding and use pinpointed, exhaustive, expeditious and economical (22). Even for a minimal level of use of the library requires guidance of the reader in the use of library tools. To get an active participation of the reader in document finding, requires a more intimate trilogue between the reader, the librarian, and the system for document finding. Therefore, we may here emphasise that the rendering of names in the library catalogue on the basis of the Canon of Recall Value does not in any way obviate the need for guiding the reader in the use of the catalogue. But, once the reader gets this guidance, the library catalogue may now be expected to function with greater efficiency than heretofore.

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RENDERING OF NAMES OF CORPORATE BODIES IN HEADINGS. (Implication of the Canon of Recall Value. 1).

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As an externalised memory, a library catalogue should be able to (1) Predict the appropriate cue for the name of an entity by which a reader may approach a catalogue; and (2) Display, in the context of the cue chosen, the necessary and sufficient visual aids to help exact recall. The Canon of Recall-Value can endow the library catalogue with the qualities of such an externalised memory. In brief, the Canon prescribes that in a multiworded name of an entity, the entry element is to consist of the word or word-group having the highest recall value. It is concerned with the formulation of individual rules for the rendering of headings of entries for effectively responding to the queries about documents already "known" to a reader. An entry for a known document should respond to a query about the documents, which uses (1) Correctly the name of any one of its attributes other than its subject; or (2) The word or word-group having the highest recall-value among the words constituting the name of that attribute. The choice of the word or word-group with the highest recall-value should also be governed by the need for the reduction of search-range in the library catalogue. In the context mentioned above, the Canon of Recall Value implies, in general, the formulation of (1) An objective method of determining the word or word-group with the

highest recall-value; (2) Each individual rule prescribing the entry element definitely indicating the word or word-group to be deemed to be the entry element in a particular situation; and (3) An objective method of resolving the conflict of entry element, if any. The problems of rendering each of the different kinds of the names of Corporate Bodies -- Government, Near Sovereign Body, Quasi Government, Institution, and Conference -- in the context of the implications mentioned above, are dealt with from the following points of view: (1) The nature of word or word-group constituting the name of the corporate body concerned; (2) The relative distribution of recall-value among the varieties of words; (3) The rules for determining the entry element; (4) Examples demonstrating the application of the rules; and (5) Evaluation of the existing pertinent prescriptions of CCC and AACR. The following generalised rule is arrived at: The Entry Element in the multiworded name of a Corporate Body is to consist of the earliest of the following which the name admits of: (1) The word or word-group indicating the purview of the entity concerned; and (2) The name of the entity as a whole, in the case of a name not admitting a word or word-group of the kind mentioned in category 1 above.

C SCOPE OF THE PAPER

The psychological basis of the Canon of Recall has been discussed in another paper of this Seminar (2). In brief, the Canon prescribes that in a multiworded name of an entity, the entry element is to consist of the word or word-group having the highest recall value (5) This paper deals with the implication of the Canon of Recall Value to the formulation of the individual rules for rendering the multiworded name of the following entities:

1 A Whole-Corporate body; and

2 An Organ-of-Corporate body.

The specific rules for rendering the names of these entities in the Heading of an entry have been dealt with earlier (1).

1 LIBRARY CATALOGUE

11 An externalised Memory

A catalogue serves as an externalised memory to the user. As such, it should be able to

1 Predict the appropriate cue for the name of an entity by which a reader may approach a catalogue; and

2 Display, in the context of the cue chosen, the necessary and sufficient visual aids to help exact recall.

12 Purview of the Canon of Recall Value

The functions of a library catalogue can be summarised as follows:

1 To respond to a query for a document under a specific sought heading; and

2 To assist the choice of a particular document.

A sought heading for a document usually consists of the name of an attribute -- such as, author, collaborator, title, series, and subject -- of the document concerned. The ability to specify a docu ment using the name of one or more of these attributes, implies that the reader has prior acquaintance, in some form or other, with the document concerned, and that he is still in a position to recall the name of one or more of its attributes other than its subject. In relation to a reader, such a document may be said to be a "known" one. On the other hand, the specification of a document by using the name of its subject implies, either that the reader had no prior acquaintance with the document concerned, or that, even if he had it, he is no more in a position to recall the name of any one of its attributes other than its subject. In relation to a reader, such a document may be said to be an "unknown" one.

These findings help to determine the purview of the Canon of Recall Value. The prescription of the Canon of Recall Value is concerned with the formulation of individual rules for the rendering of the headings of entries meant for responding to the queries about documents already "known" to the reader.

13 Recall Value and Entry Element

The term 'Recall-value' in the Canon refers to the relative potency of a word or word-group in a multiworded name, of being called back to memory. Recall-value is unevenly distributed among the words in a multiworded name. And in that sense, each word in a multiworded name has some degree of recall-value. Therefore, theoretically any word in a multiworded name may be deemed to be a "cue" for the purpose of recalling, and therefore, is a claimant for the entry element. The cost of implementing this a priori finding in a catalogue is out of proportion to the return it gives. Therefore, a compromise becomes necessary. This compromise restricts the aim of a pertinent entry for a "known" document as follows:

An entry for a document "known" to a reader should respond to a query about the document made by

1 Using correctly the name of a pertinent attribute; or

2 Using the word or word-group having the highest recall value among the words constituting the multiworded name of a pertinent attribute.

14 Two Methods

The objective mentioned above can be achieved in one of the two ways as follows:

1 By rendering the name of the pertinent attribute in two ways in the headings of two different entries; or

2 By recognising the word or word-group with the highest recall-value as the entry element for the heading of a single entry.

15 Preferred Method

Obviously, the second method is more economical than the first one. However, in that case the set of rules for rendering the multiworded names of the pertinent attributes should be simple, such that the readers can easily learn the practice, even as they are made aware of the entry element in the case of a western name of person.

16 Reduction of Search-Range

In a particular situation, a term such as the one indicative of the corporate nature *qua* corporate nature of a Corporate Body may appear to have equal or more recall value than that of a term indicative of the purview of the Corporate Body concerned. In such a situation, the choice of the word or word-group with the highest recall value has to be governed by the consideration of the reduction of search-range in the catalogue. In other words, the word or word-group, the choice of which will definitely reduce the search range in the catalogue, is to be deemed to have the highest recall value.

17 Alternative Name

The name of an attribute -- such as, author, collaborator, title, and series -- of a document may have one or more alternative names. To deal with this special problem of choosing one of the names for rendering in the heading, it is necessary to formulate a principle to govern the choice. The consideration of the "relative recall-value" of the different names as a whole can form the basis for the formulation of such a principle. The principle may take the following form:

The name to be chosen for rendering the name of an attribute -- such as, author, collaborator, title and series -- of a document is to be the one in the shortest form.

18 Variant Forms of Name

The words in the name of one and the same attribute may occur in variant forms in different documents. This gives rise to a special problem of uniformisation of the name concerned. The uniformisation of the name may consist, either of choosing one of the variant forms already existing, or of establishing a new one by the cataloguer. What is to be preferred will depend upon the situation. Obviously, the uniformised name is to be used for the purpose of rendering it in the heading.

2 GENERAL IMPLICATION

21 Basis for Formulation and Evaluation of Rule

The implications of the Canon of Recall Value on the formulation of the individual rules for rendering are to be determined in the context of the factors mentioned in Sec 1 of this paper. They furnish simultaneously the basis for the formulation, as well as for the evaluation of an individual rule prescribing the entry element for a multiworded name in the heading.

22 Enunciation of General Implication

In general terms, the implications may be expressed as the formulation of the following:

1 An objective method of determining the word or word-group having the highest recall-value among the multiworded name of an attribute --- such as, author, collaborator, title, and series -- of a document.

2 An individual rule prescribing the entry element for a name in the heading, should categorically mention the indication of the word or word-group to be deemed to be the entry element in a particular situation; and

3 An objective method of resolving a conflict between two words or two word-groups, claiming the status of the entry element in the heading.

23 Suggestions

231 Suggestion 1

General Implication 1 calls for a thorough study of the nature of the terms constituting the multiworded name of an attribute of a document other than its subject. Such a name may be the name of an author, or of a collaborator; or it may be a title. The name of an author may be the name of a person, or of a corporate body. On the basis of this study, the nature of the words or of word-groups having the highest recall value in the different kinds of names are to be determined. And that will furnish an objective method of determining the word or word-group having the highest recall value.

232 Suggestion 2

General Implication 2 calls for the formulation of the individual rules for rendering on the basis of the results of the study suggested by General Implication 1. It will then be possible to mention categorically in each rule the indication of the word or word-group to be deemed to be the entry element in a particular situation.

233 Suggestion 3

General Implication 3 calls for incorporating in each rule a sequence of preference of choice of the word or word-group to be deemed to be the entry element in a particular situation. And that will furnish an objective method of resolving a conflict between two words or two word-groups, claiming the status of the entry element in a heading. Obviously, this has to be based on the results of the study suggested by General Implication 1 and on the preliminary version of the rules drafted to satisfy General Implication 2.

24 Plan of Work

The following sections attempt to implement the above findings taking the name of each kind of corporate body by itself -- that is, uncomplicated by association with the names of other kinds.

3 NAME-OF-PERSON

A detailed study of the structure of the multi-worded names-of-person and of the nature of the words constituting them has already been carried out by Ranganathan (4). One of the findings of this study is that the Canon of Prepotence yields an important deduced principle applicable to the choice of the entry element in a multiworded name-of-person chosen for use as the heading of an entry. This principle is a statistical one. It states

"The entry element should be chosen from among that group of the words, occurring in the multiworded name-of-person chosen for use as a heading, that is more numerous than the groups of the other words occurring in it (3).

The entry element in a multiworded name-of-person chosen according to this statistical principle is in full agreement with what is suggested by the Canon of Recall-Value. This paper does not go into the details about the entry element in a multiworded name-of-person.

4 NAME OF GOVERNMENT

The term 'Government' is a generic one to denote "Whole Government" and "Organ-of-Government". We shall study them one after the other.

41 Whole Government

411 Nature of Word or Word-Group

A substantive word or word-group forming part of a multiworded name of a whole government may be indicative of an idea, such as the following:

1 The territory or area of jurisdiction forming

the purview of the Whole Government -- such as, the word 'India', and 'Mysore', and the word-groups 'United States of America', and 'Union of Soviet Socialist Republics'.

Note.- It may be noted that the name of a Territory in the name of a Government actually defines the class of persons (community) forming the purview of the Government.

2 The nature of the form-of-government -- such as, the word 'Republic' and the word-groups 'Peoples Republic', 'Federal Republic', 'Democratic Republic' and 'Socialist Republic'.

3 The corporate nature qua corporate nature of the Whole Government, such as the word 'Government'.

Note.- The word 'Government' may not occur compulsorily in each name of the Whole Government. Sometimes the name of the territory alone is used to denote a Whole Government. /A select list of English words or word-groups indicative of the corporate nature qua corporate nature of a body is given in an earlier paper (1)_7.

412 Distribution of Recall-Value

It has already been noted that the word 'Government' may or may not occur in the name of a Whole Government. Secondly, its relative potency of serving as a cue is very poor. So also is the case with a term indicative of the form of government. Obviously the word or word-group indicative of the territory or area of jurisdiction forming the purview of the Government concerned, has the highest recall-value. It may be noted that in some cases, the word-group indicating the territory or area of jurisdiction may consist of a word-group denoting the form-of-government and other words. The word-group 'Union of Soviet Socialist Republics' is an illustrative example. It has been found that there is hardly any probability of a conflict of entry element in the name of a Whole Government.

413 Entry Element

The findings in Sec 412 lead to the formulation of the following rule:

The Entry Element in the multiworded name of a Whole Government in the Heading of any entry is to consist of the word or word-group indicative of the Territory or Area of Jurisdiction forming the purview of the Government.

414 Example

According to the rule mentioned in Sec 413, the word or word-group mentioned against the name of each Whole Government in the following table, will form the basis for determining the entry element for the name concerned:

SN	Name of Whole Government		Basis for Entry Element
1	Government of India	..	INDIA
2	Government of Mysore	..	MYSORE
3	Government of the United States of America	..	UNITED STATES OF AMERICA
4	Government of Peoples Republic of China	..	CHINA
5	Government of the Union of Soviet Socialist Republics	..	UNION OF SOVIET SOCIALIST REPUBLICS

Note.- An Entry Element chosen according to the rule mentioned in Sec 414, may not always be in singular form or in noun form. If so, for all practical purposes, it may have to be reduced to singular form or to noun form, as the case may be, provided such a reduction does not in any way affect the recall-value of the Entry Element. Therefore, the word or word-group chosen initially forms the basis for determining the entry element for the name concerned.

415 Prescription of CCC and AACR

The practice of determining the entry element in the multiworded name of a Whole Government, as mentioned in Sec 413, has been a convention well established by the cataloguing profession. Both CCC and AACR have prescribed the practice. The Canon of

Recall Value furnishes the rational basis for such a practice.

42 Organ-of-Government

420 Kinds of Organ

An Organ-of-Government may be one of the following kinds:

1 Executive;
2 Legislative;
3 Judicial;
4 Administrative; and
5 Temporary.

421 Nature of Word or Word-Group

A substantive word or word-group forming part of a multiworded name of an Organ-of-Government may be indicative of an idea such as the following:

1 The designation of an executive deemed to be an Organ of the Whole Government -- such as the word 'President' and the word-groups 'Vice-President', and 'Prime Minister'.

2 A Class of Persons (executives) forming the purview of the Organ-of-Government -- such as, the words 'Ministers' and 'Deputies'.

3 The nature of the function of the Organ-of-Government -- such as, the words 'Executive' and 'Legislative'.

4 The sphere of work or function (subject) forming the purview of the Organ-of-Government -- such as, the words 'Education' and 'Commerce', and the word-groups 'External Affairs'.

5 The dominant traditional sphere of work cum

corporate nature of the Organ-of-Government -- such as the word 'Court' and the word-groups 'Supreme Court', 'High Court', 'County Court', and 'Magistrate's Court'.

6 The corporate nature qua corporate nature of the Organ-of-Government -- such as, the words 'Council', 'Chamber', 'Assembly', 'Ministry', and 'Commission'.

422 Distribution of Recall Value

In general, except for a word or word-group indicative of the corporate nature qua corporate nature of an Organ-of-Government, any other substantive word or word-group occurring in it is taken to be indicative of its purview. Therefore, such a word or word-group has comparatively higher recall value. In general, there is a very low probability of a conflict between two words or word-groups simultaneously indicative of the purview of the Organ-of-Government claiming as entry elements. But there may be a conflict between a term indicative of the dominant traditional sphere of work cum corporate nature and one indicative of the purview of the Organ-of-Government.

423 Entry Element

The findings in Sec 422 lead to the formulation of the following rule:

The Entry Element in the multiworded name of an Organ-of-Government in the Heading of any Entry is to consist of the earliest of the following which the name admits of:

1 The word or word-group indicating the designation of an executive, or a class of persons (executive), or a function or a sphere of work (subject) forming the purview of the Organ-of-Government;

2 The word or word-group indicating the dominant traditional sphere of work *cum* corporate nature of the Organ-of-Government; and

3 The name of the Organ-of-Government as a whole, in the case of a name not admitting a word or word-group of any one of the kinds mentioned in categories 1 and 2 above.

424 Example

According to the rule mentioned in Sec 423, the word or word-group mentioned against the name of each Organ-of-Government in the following table, will form the basis for determining the Entry Element for the name concerned:

SN	Name of Organ-of-Government	Basis for Entry Element
1	Executive Council ..	EXECUTIVE
2	Council of Ministers ..	MINISTERS
3	Chamber of Deputies ..	DEPUTIES
4	Legislative Assembly ..	LEGISLATIVE
5	Central Criminal Court ..	CRIMINAL
6	Court of Appeals ..	APPEALS
7	Ministry of External Affairs	EXTERNAL AFFAIRS
8	Finance Commission ..	FINANCE

425 Prescription of CCC and AACR

The prescriptions of the *Classified catalogue code* (1964) for determining the entry element in the multiworded name of an administrative and temporary Organ-of-Government are found to be in full agreement with the rule mentioned in Sec 423. The Canon of Recall Value furnishes the rational basis of such a practice; and it suggests its extension to the determination of the entry element in the name of each kind of Organ-of-Government. The prescriptions of the Anglo-American Cataloguing Rules are not in agreement with the rule mentioned in Sec 423.

5 NAME OF NEAR-SOVEREIGN BODY

The term 'Near-Sovereign Body' is a generic one to denote "Whole Near-Sovereign Body" and "Organ-of-Near-Sovereign Body". We shall study them one after the other.

51 Whole Near-Sovereign Body

511 Nature of Word or Word-Groups

A substantive word or word-group forming part of a multiworded name of a Whole Near-Sovereign Body may be indicative of an idea such as the following:

1 The subject forming the purview of the Whole Near-Sovereign Body -- such as, the word-groups 'Economic Cooperation', and 'African Unity'.

2 The community indicated by the name of a territory or geographical area or by some other word or

C1 03

word-group, the affairs of which form the subject of purview or sphere of work of the Whole Near-Sovereign Body -- such as, the word 'Europe' and the word-group 'United Nations', 'North Atlantic', and 'South-East Asia'.

3 The corporate nature qua corporate nature of the Whole Near-Sovereign Body -- such as, the words 'Organisation' and 'Council'.

512 Distribution of Recall-Value

In general, except for a word indicative of the corporate nature qua corporate nature of a Whole Near-Sovereign Body, any other word or word-group occurring in it is taken to be indicative of its purview. Therefore, such a word or word-group has comparatively higher recall-value. Further, there may be a conflict between two words or word-groups simultaneously indicative of the purview of the Whole Near-Sovereign Body, claiming as entry element.

513 Entry Element

The findings in Sec 512 lead to the formulation of the following rule:

"The Entry Element in the multiworded name of a Whole Near-Sovereign Body in the heading of any entry is to consist of the earliest of the following which the name admits of:

1 The word or word-group indicating the subject forming the purview of the Whole Near-Sovereign Body;

2 The word or word-group indicating the community (denoted by the name of a territory or geographical area), the affairs of which form the subject of purview or sphere of work of the Whole Near-Sovereign Body; and

3 The name of the Near-Sovereign Body as a whole in the case of a name not admitting a word or word-group of any one of the kinds mentioned in categories 1 and 2 above.

514 Example

According to the rule mentioned in Sec 424, the word or word-group mentioned against the name of each Near-Sovereign Body in the following table will form the basis for determining the Entry Element for the name concerned.

SN	Name of Near-Sovereign Body	Basis for Entry Element
1	United Nations Organisation	UNITED NATIONS
2	North Atlantic Treaty Organisation	NORTH ATLANTIC
3	Council of Europe	EUROPE
4	Organisation of American States	AMERICAN STATES
5	Organisation of African Unity	AFRICAN UNITY

515 Prescription of CCC and AACR

The recognition of Near-Sovereign Bodies as a distinct category of corporate bodies, for the purpose of cataloguing, is very recent. The Classified catalogue code (1964) has, for the first time, recognised the United Nations as a Corporate Body, creating problems in cataloguing in relation to works of governmental delegation to the United Nations. The Anglo-American cataloguing rules(1967) has recognised the problems of cataloguing created by the United Nations in relation to "Charter" and "Agreement". In both the Codes mentioned above, the rules for rendering the name of a Whole Near-Sovereign Body are analogous to those for the rendering of the name of a Whole Institution. They are not, however, in conformity with the prescription of the Canon of Recall-Value. The Classified catalogue code will incorporate in its Ed 6 a separate set of rules, formulated on the basis of the Canon of Recall Value, for the rendering of the name of a Whole Near-Sovereign Body.

52 Organ-of-Near-Sovereign Body

520 Kinds of Organ

An Organ-of-Near-Sovereign Body may be one of the following kinds:

1 Executive;
2 Legislative;
3 Judicial;
4 Administrative; and
5 Temporary.

521 Nature of Word or Word-Group

A substantive word or word-group forming part of a multiworded name of an Organ-of-Near-Sovereign Body may be indicative of an idea such as the following:

1 The designation of the executive deemed to be an Organ of the Whole Near-Sovereign Body -- such as, the word-group 'Secretary-General'.

2 A class of persons forming the purview of the Organ -- such as, the words 'Ministers' and 'Jurists'.

3 The sphere of work or function (subject) forming the purview of the Organ -- such as, the words 'Security' and 'Trusteeship', 'Economic', 'Social', 'Trade', 'Development', and 'Military'.

4 The dominant traditional sphere of work cum corporate nature of the Organ -- such as, the word 'Court'.

5 The corporate nature qua corporate nature of the Organ -- such as, the words 'Assembly', 'Council', and 'Committee'.

522 Distribution of Recall-Value

In general, except for a word or word-group indicative of the corporate nature qua corporate nature of an Organ-of-Near-Sovereign Body, any other substantive word or word-group occurring in it, is taken to be indicative of its purview. Therefore, such a word or word-group has comparatively higher recall value. It has been found that there is a very low probability of a conflict between two words or word-groups simultaneously indicative of the purview of the Organ-of-Near-Sovereign Body claiming as entry element. But there may be a conflict between a term indicative of the dominant traditional sphere of work cum corporate nature, and one indicative of the purview of the Organ-of-Near-Sovereign Body.

523 Entry Element

The findings in Sec 522 lead to the formulation of the following rule:

The Entry Element in the name of an Organ-of-Near-Sovereign Body in the heading of any entry is to consist of the earliest of the following which the name admits of:

1 The word or word-group indicating the designation of an executive, or a class of persons, or a function, or a sphere of work (subject) forming the purview of the Organ;

2 The word or word-group indicating the dominant traditional sphere of work cum corporate nature of the Organ; and

3 The name of the Organ-of-Near-Sovereign Body as a Whole, in the case of a name not admitting a word or word-group of any one of the kinds mentioned in categories 1 and 2 above.

524 Example

According to the rule mentioned in Sec 523, the word or word-group mentioned against the name of each Organ-of-Near-Sovereign Body in the following table will form the basis for determining the Entry Element for the name concerned:

SN	Name of Organ-of-Near Sovereign Body	Basis for Entry Element
1	Security Council	SECURITY
2	International Court of Justice	JUSTICE
3	Pan American Union	PAN AMERICAN
4	Council of Foreign Ministers	FOREIGN MINISTERS
5	Military Committee	MILITARY

525 Prescription of CCC and AACR

The Classified catalogue code (1964) prescribes that the rendering of the name of an Organ of an Institution is to be analogous to that of the name of an Administrative Organ-of-Government. CCC, by implication, has so far treated a Near-Sovereign Body as if it were an Institution. In this sense, the implied rules for rendering the name of an Organ-of-Near-Sovereign Body in CCC are in conformity with the Canon of Recall Value. However, CCC will incorporate in its Ed 6 a separate set of rules, formulated on the basis of the Canon of Recall-Value, for the rendering of the name of an Organ-of-Near-Sovereign Body. The prescription of the Anglo-American cataloguing rules (1967) is not in conformity with the Canon of Recall-Value.

6 NAME OF QUASI-GOVERNMENT

The term 'Quasi-Government' is a generic one to denote "Whole Quasi-Government" and Organ-of-Quasi-Government. We shall study them one after the other.

61 Whole Quasi-Government

611 Nature of Word or Word-Group

A substantive word or word-group forming part of a multiworded name of a Whole Quasi-Government may be indicative of an idea, such as the following:

1 The territory or area of jurisdiction forming the purview of the Quasi-Government -- such as, the words 'Mysore (District)' and 'Bangalore (City)'.

2 The corporate nature qua corporate nature -- such as the words 'Municipality' and 'Corporation'; and the word-groups 'District Board' and 'Taluk Board'.

612 Distribution of Recall-Value

Obviously, the word or word-group indicative of the territory or area of jurisdiction forming the purview of the Quasi-Government concerned has the highest recall-value. There is practically no probability of a conflict between two or more words or word-groups in the name of a Whole Quasi-Government, claim-as entry element.

613 Entry Element

The findings mentioned in Sec 612 lead to the formulation of the following rule:

The Entry Element in the multiworded name of a Whole Quasi-Government is to consist of the word or word-group indicating the Territory or Area of Jurisdiction -- such as, the name of a District, Taluk, Municipality, Corporation, Panchayat, or their respective equivalents -- forming the purview of the Quasi-Government concerned.

614 Example

According to the rule mentioned in Sec 613, the word or word-group mentioned against the name of each Whole Quasi-Government in the following table, will form the basis for determining the Entry Element for the name concerned:

SN	Name of Whole Quasi-Government		Basis for Entry Element
1	District Board of Coimbatore	..	COIMBATORE
2	Taluk Board of Tanjavur	..	TANJAVUR
3	Bangalore Municipality	..	BANGALORE

615 Prescription of CCC and AACR

The recognition of Quasi-Governments as a distinct category of corporate bodies for the purpose of cataloguing, is very recent. In the Classified catalogue code (1964), a Quasi-Government has been distinguished as a Government in Sense 2. The Anglo-American cataloguing rules (1967) also includes "Quasi-Government" within the definition of "Government". For this reason, the practice of determining the Entry Element in the multiworded name of a Whole Quasi-Government, as mentioned in Sec 613, has been a convention well-established by the cataloguing profession. Now, the Canon of Recall-Value furnishes the rational basis for this practice.

62 Organ-of-Quasi-Government

620 Kinds of Organ

An Organ-of-Near-Sovereign Body may be one of the following kinds:

1 Executive; 3 Administrative; and
2 Legislative; 4 Temporary.

621 Nature of Word or Word-Group

A substantive word or word-group forming part of a multi-worded name of an Organ-of-Quasi-Government may be indicative of an idea, such as the following:

1 The designation of the executive deemed to be an Organ of the Whole Quasi-Government -- such as, the word 'Chairman' and the word-group 'Vice-Chairman'.

2 A class of persons (executives) forming the purview of the Organ -- such as, the words 'Councillors', 'Commissioners'.

3 The function of the Organ -- such as the word 'Executive'.

4 The sphere of work or function (subject) forming the purview of the Organ -- such as, the words 'Engineering', 'Water', and 'Health'.

5 The corporate nature qua corporate nature of the Organ -- such as the words 'Department', 'Office', and 'Committee'.

622 Distribution of Recall-Value

In general, except for a word or word-group indicative of the corporate nature qua corporate nature of an Organ-of-Quasi-Government, any other substantive word or word-group occurring in it, is taken to be indicative of its purview. Therefore, a word or word-group indicative of the purview of an Organ-of-Quasi-Government has comparatively higher recall-value. Further, there is a very low probability of a conflict between two words or word-groups simultaneously indicative of the purview of the Organ-of-Quasi-Government, claiming as entry element.

623 Entry Element

The findings in Sec 622 lead to the formulation of the following rule:

The Entry Element in the multiworded name of an Organ-of-Quasi-Government in the Heading of any Entry is to consist of the earliest of the following which the name admits of:

1 The word or word-group indicating the designation of an executive, or a class of persons (executives), or a function, or a sphere of work (subject) forming the purview of the Organ; and

2 The name of the Organ-of-Quasi-Government as a whole, in the case of a name not admitting a word or word-group of the kind mentioned in category 1 above.

624 Example

According to the rule mentioned in Sec 623, the word or word-group mentioned against the name of each Organ-of-Quasi-Government in the following table, will form the basis for determining the Entry Element for the name concerned:

SN	Name of Organ-of-Quasi-Government		Basis for Entry Element
1	Engineering Department	..	ENGINEERING
2	Health Office	..	HEALTH
3	Commissioners Office	..	COMMISSIONERS

625 Prescription of CCC and AACR

It has already been mentioned in Sec 615 that in the different cataloguing codes, "Quasi-Government" has so long been included within the definition of the term 'Government'. For this reason, the prescription of the Classified catalogue code (1964) for determining the Entry Element in the multiworded name of an Administrative and Temporary Organ-of-Government is found to be in full agreement with the rule mentioned in Sec 623. The Canon of Recall-Value furnishes the rational basis of such a practice; and it suggests its extension to the determination of the Entry Element in the name of each kind of Organ-of-Quasi-Government. By implication, the pertinent rules in the Anglo-American cataloguing rules (1967) are not in conformity with the Canon of Recall-Value.

7 NAME OF INSTITUTION

The term 'Institution' is a generic one to denote

"Whole Institution" and "Organ-of-Institution". We shall study them one after the other.

71 Whole Institution

711 Nature of Word or Word-Group

A substantive word or word-group forming part of a multiworded name of a Whole Institution may be indicative of an idea, such as the following:

1 The subject qua subject forming the purview of the Whole Institution -- such as, the words "Physics", "Biology", and "Linguistics".

2 A class of persons forming the purview of the Whole Institution -- such as the words 'Librarians', 'Physicists', 'Musicians', 'Citizens', and 'Residents'.

3 A class of corporate bodies forming the purview of the whole institution -- such as the word-groups 'Scientific Unions' and 'Library Associations'.

4 The nature of the research or investigation carried out by the institution as a whole -- such as the word-groups 'Advanced Studies' and 'Fundamental Research'.

5 The dominant traditional sphere of work cum corporate nature of a Whole Institution -- such as the words 'University', 'College', 'School', 'Laboratory', 'Library' and 'Museum'.

6 The name of a person not forming the subject or the purview of the Whole Institution -- such as,

the word-groups 'Lady Shri Ram' and 'Motilal Nehru'.

7 The name of a geographical area denoting the place of origin or establishment or the geographical restriction of the purview of the Whole Institution -- such as the words 'India', 'Canadian', and 'USA'.

8 The sponsorship, status, geographical restriction, etc of the Whole Institution -- such as the words 'State', 'Federal', and 'International'.

9 The corporate nature qua corporate nature of the Whole Institution -- such as, the words 'Association' and 'Society'.

712 Distribution of Recall-Value

Each kind of word or word-group mentioned in categories 1 to 5 in Sec 711 may be taken to be indicative of the purview of a Whole Institution. On the other hand, the word or word-group mentioned in categories 6 to 9 is not indicative of the sphere of work or the purview of a Whole Institution. Obviously a word or word-group indicative of the purview of a Whole Institution has comparatively higher recall-value. Further, there is a possibility of a conflict between two or more words or word-groups simultaneously indicative of the purview of the Whole Institution, claiming as entry element.

713 Entry Element

The findings in Sec 712 lead to the formulation of the following rule:

The Entry Element in the multiworded name of a Whole Institution in the Heading of any Entry is to consist of the earliest of the following which the name admits of:

1 The word or word-group indicating a subject forming the purview of the Whole Institution;

2 The word or word-group indicating a class of persons or of corporate bodies forming the purview of the Whole Institution;

3 The word or word-group indicating the nature of research or investigation -- such as, 'Advanced Studies', 'Fundamental Research', and 'Applied Research' -- forming the purview of the Whole Institution;

4 The word or word-group indicating the dominant traditional sphere of work _cum_ corporate nature -- such as, 'University', 'College', 'School', 'Laboratory', 'Library', and 'Museum' -- of the Whole Institution;

5 The fanciful word or word-group including the name of a person not forming the subject or the purview of the Whole Institution; and

6 The name of the institution as a whole in the case of a name not admitting a word or word-group of any one of the kinds mentioned in categories 1 to 5 above.

714 Example

According to the rule mentioned in Sec 713, the word or word-group mentioned against the name of each

Whole Institution in the following table, will form the basis for determining the Entry Element for the name concerned.

SN	Name of Whole Institution	Basis for Entry Element
1	Geographical Society of India	GEOGRAPHICAL
2	South India Society of Painters	PAINTERS
3	International Council of Scientific Unions	SCIENTIFIC UNIONS
4	Institute of Advanced Studies	ADVANCED STUDIES
5	University of Calcutta	UNIVERSITY
6	Society of Sigma XI	SIGMA XI
7	British Council	BRITISH COUNCIL
8	Kalyani Agricultural University	AGRICULTURE
9	Lady Shri Ram College for Women	WOMEN

715 Prescription of CCC and AACR

The prescription of the Classified catalogue code (1964) for determining the Entry Element in the multiworded name of a Whole Institution is not in agreement with the rule mentioned in Sec 713. So also is the case with the pertinent rules in the Anglo-American cataloguing rules (1967). It is evident, therefore, that the rules referred to above, are not in conformity with the Canon of Recall-Value. However, the Classified catalogue code will incorporate in its Ed 6, the set of rules formulated on the basis of the Canon of Recall-Value, for the rendering of the name of a Whole Institution.

72 Organ-of-Institution

720 Kinds of Organ

An Organ-of-Institution may be one of the following kinds:

1	Executive;	3	Administrative; and
2	Deliberative;	4	Temporary.

721 Nature of Word or Word-Group

A substantive word or word-group forming part of a multiworded name of an Organ-of-Institution may be indicative of an idea, such as the following:

1 The designation of an executive deemed to be an Organ of the Whole Institution -- such as, the words 'President', 'Chairman', and 'Secretary'.

2 A class of persons forming the purview of the Organ-of-Institution -- such as, the word 'Governors'.

3 The nature of the function of the Organ-of-Institution -- such as the words 'Government', and 'Executive'.

4 The sphere of work or function (subject) forming the purview of the Organ-of-Institution -- such as the words 'Education', 'Nutrition', and 'Tourism'.

5 The corporate nature qua corporate nature of the Organ-of-Institution -- such as, the words 'Council', 'Committee', and 'Board'.

722 Distribution of Recall-Value

It may be noted that except for a word or word-group indicative of the corporate nature qua corporate nature of an Organ-of-Institution, any other substantive word or word-group occurring in it may be interpreted to be indicative of its purview. Obviously, a word or word-group indicative of the purview of an Organ-of-Institution has comparatively higher recall value. Further, there is practically no probability of a conflict between two or more words or word-groups simultaneously indicative of the purview of the Organ-of-Institution, claiming as entry element.

723 Entry Element

The findings in Sec 722 lead to the formulation of the following rule:

The Entry Element in the multiworded name of an Organ-of-Institution in the Heading of any Entry, is to consist of the earliest of the following which the name admits of:

1 The word or word-group indicating the designation of an executive, or a class of persons (executives), or a function, or a sphere of work (subject) forming the purview of the Organ-of-Institution; and

2 The name of the Organ-of-Institution as a whole in the case of a name not admitting a word or word-group of any one of the kinds mentioned in category 1 above.

724 Example

According to the rule mentioned in Sec 723, the word or word-group mentioned against the name of each

Organ-of-Institution in the following table, will form the basis for determining the Entry Element for the name concerned.

SN	Name of Organ-of-Institution		Basis for Entry Element
1	Board of Governors	..	GOVERNORS
2	Committee on Tourism	..	TOURISM
3	Productivity Team on Materials Handling	..	MATERIALS HANDLING

725 Prescription of CCC and AACR

The Classified catalogue code (1964) prescribes that the rendering of the name of an Organ-of-Institution is to be made on the analogy of that of the name of an Administrative Organ-of-Government. According to this prescription, the implied rules for rendering the name of an Organ-of-Institution are in agreement with the rule formulated in Sec 723. Evidently, they are in conformity with the Canon of Recall Value. However, CCC will incorporate in its Ed 6 a separate set of rules, formulated on the basis of the Canon of Recall Value, for the rendering of the name of an Organ-of-Institution. The pertinent rules in the Anglo-American cataloguing rules (1967) are not in conformity with the Canon of Recall Value.

8 NAME OF CONFERENCE

The term 'Conference' is a generic one to denote

'Whole Conference' and 'Organ-of-Conference'. We shall study them one after the other.

81 Whole Conference

811 Nature of Word or Word-Group

A substantive word or word-group forming part of a multiworded name of a Whole Conference may be indicative of an idea such as the following:

1 The subject qua subject forming the purview of the Whole Conference -- such as, the words 'Geography', 'Spectroscopy', and the word-group 'Atomic Absorption Spectroscopy'.

2 A class of persons forming the purview of the Whole Conference -- such as the word-groups 'Christian Physicians' and 'Indian Residents'.

3 The name of a geographical area denoting the place of the conference or the geographical restriction of the purview of the Conference -- such as, the words 'Louisiana' and 'Paris'.

4 The status, in terms of the general geographical restriction, of the Whole Conference -- such as the words 'State, 'National', and 'International'.

5 The corporate nature qua corporate nature of the Whole Conference -- such as, the words 'Conference', 'Seminar', 'Symposium', 'Institute', and 'Workshop'.

812 Distribution of Recall-Value

Each word or word-group mentioned in categories 1 and 2 in Sec 811 may be taken to be indicative of the purview of a Whole Conference. On the other hand, the word or word-group mentioned in categories 3 to 5 are not indicative of the sphere of work or the purview of a 'Whole Conference'. √ Therefore, a word or word-group indicative of the sphere of work or purview of a Whole Conference has comparatively higher recall value. Further, there is practically no probability of a conflict between two or more words or word-groups simultaneously indicative of the purview of the Whole Conference, claiming as entry element.

813 Entry Element

The findings in Sec 812 lead to the formulation of the following rule:

The Entry Element in a multiworded name of a Whole Conference in the Heading of any Entry is to consist of the earliest of the following which the name admits of:

1 The word or word-group indicating the subject or the class of persons forming the purview of the Whole Conference; and

2 The name of the Conference as a whole in the case of a name not admitting a word or word-group of any one of the kinds mentioned in category 1 above.

814 Example

According to the rule mentioned in Sec 814, the word or word-group mentioned against the name of each Whole Conference in the following table, will form the basis for determining [illegible] Entry Element for the name concerned.

SN	Name of Whole Conference	Basis for Entry Element
1	Gandhi Centennial Symposium	GANDHI
2	International Spectroscopy Colloquium	SPECTROSCOPY
3	International Conference on Atomic Absorption Spectroscopy	ATOMIC ABSORPTION SPECTROSCOPY
4	International Congress of Christian Physicians	CHRISTIAN PHYSICIANS
5	World Peace Congress	PEACE
6	Zonta International	ZONTA INTERNATIONAL

815 Prescription of CCC and AACR

The prescription of the Classified catalogue code (1964) for determining the Entry Element in the multiworded name of a Whole Conference is not in agreement with the rule mentioned in Sec 713. So also is the case with the pertinent rules in the Anglo-American cataloguing rules (1967). It is evident, therefore, that the rules referred to above, are not in conformity with the Canon of Recall-Value. However, the Classified catalogue code will incorporate in its Ed 6 a set of rules formulated on the basis of the Canon of Recall Value for the rendering of the name of a Whole Conference.

82 Organ-of-Conference

820 Kinds of Organ

An Organ-of-Conference may be one of the following kinds:

1 Executive;
2 Deliberative;
3 Administrative; and
4 Temporary.

821 Nature of Word or Word-Group

A substantive word or word-group forming part of a multiworded name of an Organ-of-Conference may be indicative of an idea, such as the following:

1 The designation of an executive deemed to be an Organ of the Whole Conference -- such as, the words 'Chairman' and 'President'.

2 A class of persons forming the purview of the Organ-of-Conference -- such as, the word-group 'Experts in – '.

3 The nature of the function of the Organ-of-Conference -- such as, the words 'Organising', and 'Reception'.

4 The sphere of work or function (subject) forming the purview of the Organ-of-Conference -- such as, the word-group 'Standardisation of Spelling'.

5 The corporate nature qua corporate nature of the Organ-of-Conference -- such as, the words 'Committee', and 'Sub-committee'.

822 Distribution of Recall-Value

Except for a word or word-group indicative of the corporate nature qua corporate nature of an Organ-of-Conference, any other substantive word or word-group occurring in it may be taken to be indicative of its purview. Therefore, a word or word-group indicative of the purview of an Organ-of-Conference has comparatively higher recall-value. Further, there is practically no possibility of conflict between two or more words or word-groups simultaneously indicative of the purview of the Organ-of-Conference, claiming as entry element.

823 Entry Element

The findings in Sec 823 lead to the formulation of the following rule:

The Entry Element in the multiworded name of an Organ-of-Conference in the Heading of any Entry, is to consist of the earliest of the following which the name admits of:

1 The word or word-group indicating the designation of an executive, or a class of persons, or a function, or a sphere of work (subject), forming the purview of the Organ-of-Conference; and

2 The name of the Organ-of-Institution as a whole in the case of a name not admitting a word or word-group of any one of the kinds mentioned in category 1 above.

824 Example

According to the rule mentioned in Sec 823, the word or word-group mentioned against the name of each Organ-of-Conference in the following table, will form the basis for determining the Entry Element for the name concerned.

SN	Name of Organ-of-Conference	Basis for Entry Element
1	Committee of Experts in Cataloguing	EXPERTS IN CATALOGUING
2	Organising Committee	ORGANISING
3	Committee on Standardisation of Spelling	STANDARDISATION OF SPELLING

825 Prescription of CCC and AACR

The Classified catalogue code (1964) has no rule directly turned on the rendering of the name of an Organ-of-Conference. So also is the case with the Anglo-American cataloguing rules (1967). However, CCC has proposed to incorporate in its Ed 6, a set of rules formulated on the basis of the Canon of Recall Value, for the rendering of the name of an Organ-of-Conference.

91 CONCLUSION

The rules given in Sec 4 to 8 can be more or less generalised as follows:

The Entry Element in the multiworded name of a Corporate Body is to consist of the earliest of the following which the name admits of:

1 The word or word-group indicating the purview of the Corporate Body concerned; and

2 The name of the Corporate Body as a whole, in the case of a name not admitting a word or word-group of the kind mentioned in category 1 above.

It is expected that in more than ninety per cent of the cases, this generalised rule will prove sufficient. It satisfies all the general implications of the Canon of Recall-Value mentioned in Sec 22. In this form, the whole set of rules given in Sec 4 to 8 gets simplified for application in practice. Because of its conformity with the Canon of Recall-Value, a library catalogue based on the above rule and on its specific versions, will be endowed with the necessary qualities of a externalised memory.

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DRTC Seminar (8)(1970). Paper AD.

RENDERING OF TITLES IN HEADINGS.

(Implication of the Canon of Recall Value. 2).

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In the context of the general implications of the Canon of Recall-Value, the problems of rendering titles in heading are dealt with from the following points of view: (1) The nature of the word or word-group constituting a multiworded title; (2) The relative distribution of recall-value among the varieties of words; (3) The rules for determining the entry element; (4) Examples demonstrating the application of the rules; and (5) Evaluation of the existing pertinent prescriptions of CCC and AACR. The following generalised rule is arrived at: The Entry Element in a multiworded title used as heading is to consist of the following which the title admits of: (1) The word or word-group indicating the purview of the document; and (2) The title as a whole, in the case of a title not admitting a word or word-group of the kind mentioned in Category 1.

0 SCOPE OF THE PAPER

The general implications of the Canon of Recall Value have been discussed in Sec 1 and 2 of Paper AB of this Seminar. This paper deals with the specific implications of the Canon of Recall Value to the formulation of the individual rules for rendering titles in headings. For convenience of discussion, Titles have been categorised as follows:

1 Title-of-Book; and

2 Title-of-Periodical Publication.

1 TITLE-OF-BOOK

If a book is a general biographical dictionary or an encyclopaedia belonging to the subject "Generalia" or "Natural Sciences", or "Useful Arts", or "Social Sciences" or if the heading for the book cannot be determined to be the name of its author(s) or of its collaborator(s), the title of the book is generally used as the heading. This brings up the problem of rendering the title in the heading of the Main Entry for the book concerned. Further, there may be a need to prepare an added entry using the title of the book as the heading.

2 NATURE OF WORD OR WORD-GROUP

A substantive word or word-group forming part of a multiworded title-of-book may be indicative of an idea, such as the following:

1 The subject qua subject forming the purview of the book -- such as, the word 'Science', and the word-group 'Social Sciences'.

2 A class of persons forming the purview of the book -- such as the word 'Scientists' and the word-group 'American Scholars'.

3 The bias (point of view or emphasis) influenc-

ing the selection of the subjects treated in the book -- such as, the words 'Americana' and 'Britannica'.

4 The form of exposition or presentation -- such as, the words 'Encyclopaedia' and 'Dictionary'.

5 Some fanciful name not forming the purview of the book.

21 Distribution of Recall Value

The substantive words or word-groups occurring in the title of a book fall into two broad groups -- those indicative of the purview and those not indicative of the purview. Therefore, a word or word-group indicative of the purview of a book has comparatively higher recall value. But it may so happen that each of the substantive words or word-groups in a title-of-book may be one not indicative of the purview of the book. In such a case, the recall-value gets concentrated in such a word or word-group. Again, there is a possibility of a conflict between two words or word-groups belonging to any one of the two groups claiming as entry element.

3 ENTRY ELEMENT

The findings in Sec 21 lead to the formulation of the following rule:

The Entry Element in a multiworded Title-of-Book in the heading of any Entry is to consist of the earliest of the following which the title admits of:

1 The word or word-group indicating a subject forming the purview of the book;

2 The word or word-group indicating a class of persons forming the purview of the book;

3 The word or word-group indicating the bias influencing the selection of the subjects treated in the book;

4 The word or word-group indicating the form of exposition or presentation in the book;

5 The fanciful word or word-group; and

6 The title-of-book as a whole in the case of a title not admitting a word or word-group of any one of the kinds mentioned in Categories 1 to 5 above.

31 Example

According to the rule mentioned in Sec 3, the word or word-group mentioned against the name of each Title in the following table, will form the basis for determining the Entry Element for the name concerned.

SN	Title	Basis for Entry Element
1	Encyclopaedia of Social Sciences	SOCIAL SCIENCES
2	Appleton's Cyclopaedia of American Biography	AMERICAN BIOGRAPHY
3	Dictionary of American Scholars	AMERICAN SCHOLARS
4	Who was Who in America	AMERICA
5	Encyclopaedia Britannica	BRITANNICA
6	Webster's Biographical Dictionary	BIOGRAPHICAL

4 PRESCRIPTION OF CCC AND AACR

The prescription of the Classified catalogue code (1964) for determining the Entry Element in a multiworded Title-of-Book is not in agreement with the rule mentioned in Sec 3, So also is the case with the pertinent rules in the Anglo-American cataloguing rules (1967). It is evident, therefore, that the rules referred to above are not in conformity with the Canon of Recall Value. However, CCC will incorporate in its Ed 6, a set of rules formulated on the basis of the Canon of Recall Value, for the rendering of a Title-of-Book in the heading.

5 TITLE-OF-PERIODICAL PUBLICATION

51 Merit of the Case

511 Theoretical Finding

The Heading of the Main Entry for a Periodical Publication is to consist of its Title. The Title of a Periodical Publication is generally multiworded. And the problem of recalling the multiworded name of a Periodical Publication is in no way different from that of recalling any other multiworded name. Therefore, theoretically the rules for rendering the multiworded name of a Periodical Publication should necessarily be formulated on the basis of the Canon of Recall Value.

512 Practical Difficulty

But, there are certain practical difficulties. They consist of the following. Periodicals are among the most widely and frequently cited documents in the learned world. To secure economy in this, national and international lists of the "standard" abbreviations for the substantive words occurring in the titles of periodicals have been compiled. These abbreviations have been arrived at on the basis of a generally agreed set of principles. The principles to abbreviate a Title-of-Periodical by using the standard abbreviated words have also been formulated. According to the latter set of principles, the Title, as it occurs in the title-page forms the basis for the abbreviation of the title. As a result, the sequence of the abbreviated words in the abbreviated title parallels that of the substantive words in the original title. Further, an abbreviation is done in such a way that it helps the reconstruction of the original word or the title, as the case may be. On the other side, a query pertaining to a particular Title-of-periodical is, in the majority of the cases, formulated on the basis of a reference in hand. This practice reduces the probability of committing a mistake while asking for a periodical by its title. These factors raise the question "Is it really helpful to formulate rules for rendering a Title-of-Periodical in conformity with the Canon of Recall Value?"

513 Arguments Against Practical Difficulty

But there is a point in favour. If the word or word-group with the highest recall-value is the entry element, it is of help to both the groups of readers -- that is, those who can mention the title accurately as well as those fail to do so. Therefore, the rendering of the Title-of-periodical according to the rules formulated on the basis of the Canon of Recall-value will not reduce the efficiency of the catalogue in any way; on the other hand, it may add to its efficiency. Hence, it is necessary to have a set of rules for the rendering of a title-of-periodical publication, formulated on the basis of the Canon of Recall Value.

52 Nature of Word or Word-Group

A substantive word or word-group forming part of a multiworded title-of-periodical publication may generally be indicative of an idea, such as the following:

1 The subject qua subject forming the purview of the periodical publication -- such as, the words 'Mathematics', 'Physics', 'Chemistry', 'Biology' and 'Biochemistry'.

2 A class of persons forming the purview of the periodical publication -- such as, the words 'Surgeons' and 'Physicians'.

3 A class of documents forming the purview of the periodical publication -- such as, the words 'Books' and the word-group 'Government Publications'.

4 The country or origin of the periodical publication -- such as, the words 'Indian', 'Canadian' and 'British'.

5 The name of the sponsor of the periodical publication -- such as, the word-groups 'International College of Surgeons' and 'Instrument Society of America'.

6 Some fanciful name not forming the purview of the periodical publication.

7 The periodical nature of the publication -- such as, the words 'Journal', 'Bulletin', and ' 'Annals'.

521 Distribution of Recall-Value

The substantive words or word-groups occurring in the title of a periodical publication fall into two broad groups -- those indicative of the purview and those not indicative of the purview. Therefore, a word or word-group indicative of the purview of a periodical publication has comparatively higher recall value. Again, there is every possibility of a conflict between two words or word-groups simultaneously indicative of the purview of the periodical publication, claiming as entry element. Another problem arises with the title containing the name of its sponsor. In such a case, the title-proper is usually a word or word-group indicative of the periodical nature of the publication. The recall-value of the word-group indicative of the name of the sponsor is comparatively higher than that of the word or word-group indicative of the periodical nature of the publication. Further, the name of the sponsor usually contains a word or word-group indicative of the sphere of work or purview of the sponsor; such a a word-group is usually indicative of the purview of the periodical publication also.

53 Entry Element

The findings in Sec 52 suggest that for the purpose of formulating the rules for rendering the titles of Periodical publications, it is helpful to categorise them initially as follows:

1 Title not containing the name of the sponsor.

2 Title containing the name of the sponsor.
This categorisation calls for two sets of rules.

531 Title not Containing the Name of the Sponsor

The Entry Element in the multiworded title of a periodical publication not containing the name of its sponsor, in the heading of the Main Entry, is to consist of the earliest of the following which the title admits of:

1 The word or word-group indicating the subject forming the purview of the periodical publication;

2 The word or word-group indicating a class of persons forming the purview of the periodical publication;

3 The word or word-group indicating a class of documents forming the purview of the periodical publication;

4 The fanciful word or word-group; and

5 The title of the Periodical Publication as a whole in the case of a title not admitting a word or word-group of any one of the kinds mentioned in categories 1 to 4 above.

532 Title Containing the Name of the Sponsor

The title of a Periodical publication containing the name of its sponsor is to be deemed to be consisting of two distinct components as follows:

1 The word or word-group indicative of the Title-Proper; and

2 The word-group indicative of the name of the sponsor.

If the Title-Proper of such a title does not admit of the application of the rule mentioned in Sec 531, then it is to be rendered according to the following rules:

1 Corresponding to the two components, the Heading is to be a Multiple Heading.

2 The First Heading is to consist of the name of the sponsor rendered in accordance with the appropriate rule for rendering the name of the Corporate Body concerned.

3 The Second Heading is to consist of the Title-Proper -- the words in it being written in the sequence in which they occur in the title of the Periodical publication.

Note.- The auxiliary word(s) -- such as, 'of' and 'of the' connecting the Title-Proper and the name of the sponsor, if any, in the title, is to be omitted.

54 Example

According to the rule mentioned in Sec 531, the word or word-group mentioned against each of the titles in the following table will form the basis for determining the Entry Element for the name concerned.

SN	Title	Basis for Entry Element
1	Japanese Journal of Genetics	GENETICS
2	International Transport Workers Journal	TRANSPORT WORKERS
3	Indian Railway Technical Bulletin	RAILWAY
4	Productivity Measurement Review	PRODUCTIVITY MEASUREMENT
5	Who's Who in the Mid-west	MIDWEST
6	Kenyon Review	KENYON

According to the rule mentioned in Sec 532, the word or word-group mentioned against each of the titles in the following table will form the basis for determining the Entry Element for the name concerned.

SN	Title	Basis for Entry Element	
		For the Name of Sponsor	For Title-Proper
1	Journal of the International College of Surgeons	SURGEONS	JOURNAL

SN	Title	Basis for Entry Element	
		For the Name of Sponsor	For Title-Proper
2	Transactions of the Instrument Society of America	INSTRUMENT	TRANSACTIONS
3	Annual Report of the Madras Library Association	LIBRARY	ANNUAL REPORT
4	Papers of the Bibliographical Society of America	BIBLIOGRAPHICAL	PAPERS
5	Journal of the Canadian Anaesthetists Society	ANAESTHETISTS	JOURNAL

55 Prescription of CCC and AACR

The prescription of the Classified catalogue code (1964) for determining the Entry Element in a multiworded Title-of-Periodical Publication is not in agreement with the rules mentioned in Sec 531 and 532. So also is the case with the pertinent rules in the Anglo-American cataloguing rules (1967). It is evident, therefore, that the rules referred to above, are not in conformity with the Canon of Recall Value.

6 CONCLUSION

The rule for rendering a Title-of-Periodical publication containing the name of its sponsor, is somewhat different from that meant for rendering a

Title-of-Book. This is because of the complex nature of such a name. The rest of the rules given above can be more or less generalised as follows:

The Entry Element in a multiworded title is to consist of the earliest of the following which it admits of:

1 The word or word-group indicating the purview of the document; and

2 The title as a whole, in the case of a title not admitting a word or word-group of the kind mentioned in category 1 above.

In this form, the detailed rules, referred to above, get simplified for application in practice. Because of its conformity with the Canon of Recall-Value, a library catalogue based on the above rule and on its specific versions, will be endowed with the necessary qualities of an externalised memory.

DRTC Seminar (8)(1970). Paper AE.

RENDERING OF NAME OF PUBLISHER'S SERIES IN HEADINGS.
(Implication of the Canon of Recall-Value. 3).

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In the context of the general implications of the Canon of Recall-Value, the problems of rendering names of publisher's series in headings are dealt with from the following points of view: (1) The nature of word or word-group constituting a multiworded name-of-publisher's series; (2) The relative distribution of recall-value among the varieties of words; (3) The rules for determining the entry element; (4) Examples demonstrating the application of the rules; and (5) Evaluation of the existing pertinent rules in CCC and AACR. The following generalised rule is arrived at: The Entry Element in a multi-worded name of a Publisher's Series is to consist of the earliest of the following which the name admits of: (1) The word or word-group indicating the purview of the Publisher's Series; and (2) The name of the Publisher's Series as a whole in the case of a name not admitting a word or word-group of the kind mentioned in Category 1 above.

0 SCOPE OF THE PAPER

The general implications of the Canon of Recall Value and their context have been discussed in Sec 1 and 2 of Paper AB of this Seminar. This paper deals with the specific implications of the Canon of Recall Value to the formulation of the individual rules for rendering name of Publisher's Series in headings.

1 NATURE OF WORD OR WORD-GROUP

A substantive word or word-group forming part of a multiworded name-of-publisher's series may generally be indicative of an idea, such as the following:

1 The subject qua subject forming the purview of the publisher's series -- such as, the word-groups 'Mechanical Engineering', and 'Nuclear Science'.

2 A class of persons forming the purview of the publisher's series -- such as, the words 'Engineers' and 'Scientists'.

3 A class of documents forming the purview of the publisher's series -- such as, the word 'Catalogue' and the word-group 'Government Publications'.

4 The name of the publisher/sponsor of the series -- such as, the word 'Wiley' and the word-group 'McGraw-Hill'.

5 Some fanciful name not forming the purview of the publisher's series -- such as the word 'Champak'.

6 The series nature -- such as, the words 'Series', and 'Library'.

2 DISTRIBUTION OF RECALL VALUE

It may be noted that the substantive words or word-groups occurring in the name of a publisher's series fall in two broad groups -- those indicative of the purview and those not indicative of the purview. Obviously, a word or word-group indicative of the purview of a publisher's series has got comparatively higher recall-value. Again, there is every possibility of a conflict of entry element between two words or word-groups simultaneously indicative of the purview of the publisher's series.

It may further be noted that the name of a publisher's series may be either "unique" or "non-unique".

When the name is "unique", it does not require the name of its publisher/sponsor to be taken along with it for use in an entry. For example, the name 'Children's World of Science Library' is a unique name-of-series. Of course, in a unique name-of-series the name of its publisher/sponsor also may occur. The name 'McGraw-Hill Series in Mechanical Engineering' is an example. In such a "unique" name, the Whole name of the publisher's series may be denoted by the term 'Series-Proper'.

When the name is a "non-unique" one, it requires the name of its publisher/sponsor to be compulsorily taken along with it for use in an entry. For example, the name 'Publication', is a non-unique name-of-series. If it is taken along with the name of its publisher --

such as, the Medical Library Association -- it results in a unique name-of-series. Again, a unique name of a publisher's series may consist of two components -- that is, a non-unique name-of-series and the name of its publisher/sponsor -- connected by some auxiliary word(s) -- such as, 'of' and 'of the'. The name 'Publications of the University of Manchester' is an example. In such a name, the "non-unique" part may be denoted by the term 'Series-Proper'.

The recall value of the word-group indicative of the name of the publisher/sponsor is comparatively higher than that of the word or word-group indicative of the 'Series-Proper'.

3 ENTRY ELEMENT

The findings in Sec 2 suggest that for the purpose of formulating rules for rendering names of publisher's series, it is helpful to categorise, the Series-Proper as follows:

1 Series-Proper with unique name; and
2 Series-Proper with non-unique name.

This categorisation naturally calls for two sets of rules as follows:

31 Series Proper with Unique Name

The Entry Element in the multi-worded name of a Publisher's Series with a unique name for its Series-Proper, in the Heading of a Specific Entry, is to consist of the earliest of the following which the name admits of:

1 The word or word-group indicating a subject forming the purview of the Publisher's Series;

2 The word or word-group indicating a Class of Persons forming the purview of the Publisher's Series;

3 The word or word-group indicating a Class of Documents forming the purview of the Publisher's Series;

4 The fanciful word or word-group; and

5 The name of the Publisher's Series as a whole in the case of a name not admitting a word or word-group of any one of the kinds mentioned in Categories 1 to 4 above.

32 Series-Proper with Non-Unique Name

The name of a Publisher's Series with a non-unique name of its Series-Proper is to be deemed to be consisting of two distinct components as follows:

1 The word or word-group indicative of the Series-Proper; and

2 The word or word-group indicative of the name of the Publisher/Sponsor.

The name of a Publisher's Series with a non-unique name of its Series-Proper is to be rendered according to the following rules:

1 Corresponding to the two components the Heading is to be a Multiple Heading.

2 The First Heading is to consist of the name of

the publisher/sponsor rendered in accordance with the appropriate rules for rendering the name of the Corporate Body concerned.

3 The Second Heading is to consist of the name of the Series-Proper -- the words in it being written in the sequence in which they occur in the name.

Note.- The auxiliary word(s) -- such as, 'of' and 'of the' -- connecting the name of the Series-Proper and the name of the publisher/sponsor, if any, in the name of the Publisher's Series, is to be omitted.

4 EXAMPLE

41 Series with a Unique Name

According to the rule mentioned in Sec 31, the word or word-group mentioned against the name of each Publisher's Series in the following table, will form the basis for determining the Entry Element for the name concerned.

SN	Name of Publisher's Series	Basis for Entry Element
1	Ranganathan Series in Library Science	LIBRARY SCIENCE
2	Wiley Farm Series	FARM
3	Haridas Sanskrit Granthamala	SANSKRIT
4	Supplementary Educational Monograph	EDUCATIONAL
5	Legislative Series	LEGISLATIVE

42 Series with a Non-unique Name

According to the rule mentioned in Sec 32, the word or word-group mentioned against the name of each Publisher's Series in the following table, will form the basis for determining the entry element for the name concerned.

SN	Name of Publisher's Series	Basis for Entry Element	
		For the Name of Publisher	For the Name of Series-Proper
1	Publication (Medical Library Association)	MEDICAL LIBRARY	PUBLICATION
2	Publications of the University of Manchester	UNIVERSITY	PUBLICATIONS
3	Bulletin of the Department of Agriculture (Bombay)	BOMBAY, AGRICULTURE	BULLETIN

5 PRESCRIPTION OF CCC AND AACR

The prescription of the Classified catalogue code (1964) for determining the entry element in the multiworded name of a Publisher's Series is not in agreement with the rules mentioned in Sec 31 and 32. So also is the case with the pertinent rules in the Anglo-American cataloguing rules (1967). It is evident, therefore, that the rules referred to above, are not in conformity with the Canon of Recall Value. However, CCC has proposed to incorporate in its Ed 6, the set of rules formulated on the basis of the

Canon of Recall Value, for the rendering of the name of a Publisher's Series in the heading of a specific entry.

6 CONCLUSION

The rule for rendering a name-of-publisher's series with a "non-unique" name of its Series-Proper, is somewhat different from that meant for rendering a unique name of Series-Proper. This is because of the complex nature of such a name. The rule given in Sec 3 can be more or less generalised as follows:

The Entry Element in a multiworded name of a Publisher's Series is to consist of the earliest of the following which the name admits of:

1 The word or word-group indicating the purview of the Publisher's Series; and

2 The name of the Publisher's Series as a whole in the case of a name not admitting a word or word-group of the kind mentioned in category 1 above.

In this form, the detailed rule, referred to above, gets simplified for application in practice. Because of its conformity with the Canon of Recall Value, a library catalogue based on the above rule and on its specific versions, will be endowed with the necessary qualities of an externalised memory.

DRTC Seminar (8)(1970). Paper AF.

RENDERING OF NAME OF ENTITY WITH MULTIPLE PURVIEW.

(Implication of the Canon of Recall Value. 4).

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In the context of the general implications of the Canon of Recall Value, the problems of rendering multiworded names of entity with multiple purview are dealt with. The factors to be considered in finding out a comparatively more effective method of dealing with such a case is emphasised. The consideration of the factors leads to the following suggestion: The Entry Element in the multiworded name of an entity with a multiple purview is to consist of the words or word-groups indicating the totality of its purview.

0 SCOPE OF THE PAPER

The problems of rendering dealt with in papers AC, AD, and AE of this Seminar, centre round multiworded names of entities with simple or single purview. This paper deals with the problems of rendering multiworded names of entities with multiple purview -- that is, names in which the word or word-group indicating the purview is expressed in terms of two or more different names of entities, such as subject, class of persons, and class of documents. The problems arising from such complex cases has been dealt with in some detail and different methods of approach to a solution have been suggested (1). In the present paper, emphasis is placed on the factors to be considered in finding a comparatively more effective method of dealing with such complex cases.

1 EXAMPLES OF COMPLEX CASES

The following are a few examples of complex cases -- that is, names with multiple purview:

1 International Union of Geodesy and Geophysics;

2 Society of Microbiologists, Epidemiologists and Hygienists in Bulgaria;

3 Council of Scientific and Industrial Research (India);

4 McGraw-Hill Encyclopaedia of Science and Technology;

5 Indian Journal of Biochemistry and Experimental Medicine;

6 International Library of Psychology, Philosophy, and Scientific Method; and

7 International Union of History and Philosophy of Science.

2 FACTORS FOR CONSIDERATION

In dealing with this problem, it is necessary to take the following factors into account:

1 The Canon of Recall Value does not suggest the creation of classified pockets in the alphabetical catalogue. Even if such a pocket occurs at some point or other in the catalogue, it is purely accidental.

2 The Canon of Recall Value is to be applied to the multiworded name of an entity in its original form. And to determine the recall value of a word or word-group, the form in which it occurs in the original name is to be taken into consideration.

3 The entry element determined according to a rule formulated on the basis of the Canon of Recall Value aims at responding to a query, the make-up of which includes within it the word or word-group forming the entry element.

It works within the range specified by the knowledge of the correct name of the entity concerned at one end, and the knowledge of the accurate word or word-group indicating the purview of the entity concerned at the other end. It is not worthwhile for an Author-Collaborator-Title Catalogue to attempt to respond to a query falling outside this range.

3 METHOD TO DEAL WITH A COMPLEX CASE

A consideration of the factors mentioned in Sec 2 suggests the following method of dealing with complex cases:

The Entry Element in the multiworded name of an entity with a multiple purview is to consist of the words or word-groups indicating the totality of its purview, written in the sequence of their occurrence in the name concerned.

This rule will call for a Cross Reference Index Entry using as the Entry Element each of the words or word-groups denoting the claimants occurring second, third, and so on, in the name concerned.

4 RESULT OF APPLYING THE METHOD

4.1 Entry Element

According to the method given in Sec 3, the basis for the entry element in each of the names mentioned in Sec 1, for the different kinds of entries, will be as follows:

SN	Basis for Entry Element	
	For Main Entry	For Cross Ref Index Entry
1	GEODESY AND GEOPHYSICS	GEOPHYSICS
2	MICROBIOLOGISTS, EPIDEMIOLOGISTS AND HYGIENISTS	1 EPIDEMIOLOGISTS 2 HYGIENISTS
3	SCIENTIFIC AND INDUSTRIAL RESEARCH	INDUSTRIAL RESEARCH
4	SCIENCE AND TECHNOLOGY	TECHNOLOGY
5	BIOCHEMISTRY AND EXPERIMENTAL MEDICINE	EXPERIMENTAL MEDICINE
6	PSYCHOLOGY, PHILOSOPHY AND SCIENTIFIC METHOD	1 PHILOSOPHY 2 SCIENTIFIC METHOD
7	HISTORY AND PHILOSOPHY OF SCIENCE	PHILOSOPHY OF SCIENCE

5 CONCLUSION

The method suggested here is in agreement with the rules for rendering the multiworded names of entities with single purview. It is in conformity with the Canon of Recall Value. Therefore, the entries made according to this method will help the library catalogue to serve as an efficient externalised memory.

6 BIBLIOGRAPHICAL REFERENCE

1 Sec 0 CATALOGUING (Seminar on —) (Bangalore) (1970). Working paper and proceedings. 1970. Chap BS.

DRTC Seminar (8)(1970). Paper AG.

RENDERING OF NAME-OF-CORPORATE BODY: READERS' REACTION.

1 APPEAL FOR SURVEY

A seminar on cataloguing with particular emphasis on the Canon of Recall Value was held in DRTC in May 1970. The potential value of the Canon in rationalising the determination of the Entry Element in the name of Corporate Bodies of different kinds in Headings of Entries was generally accepted by the participants. During the seminar, an appeal was made to the participating librarians to design experiments in their respective libraries to examine the helpfulness to readers of rendering the name of Corporate Bodies according to the implications of the Canon of Recall Value. Some methods of survey of readers' reaction were also outlined for the five librarians who evinced interest in carrying out the survey.

2 RESPONSE TO REQUEST

The libraries of the following institutions have responded:

1 School of International Studies, J N University, New Delhi. (SIS).

(Survey by Mrs Chaya Devi. Librarian: Girja Kumar)

2 University of Poona
(Survey by S G Mahajan and D W Shewde.
Librarian: K S Hingwe).

3 National Aeronautical Laboratory, Bangalore (NAL).
(Survey by T Ranganathan. Scientist (Library): M N Seetharaman).

The surveys by the Library of the Poona University and the Library of the NAL are confined to readers' reaction to rendering of Name-of-Conference according to the Canon of Recall Value.

The survey in the SIS library was done before the Cataloguing Seminar in May 1970. The survey covered rendering of name of corporate bodies of different kinds, including conference.

3 PROCEDURE

The procedure adopted in the survey in the three libraries was more or less similar. The following were the steps involved:

1 A list of names of conferences was drawn up.

Note.- The names were taken from the title page of documents embodying proceedings of conferences available in the respective libraries and also from lists of future conferences in the subjects of interests to the clientele of the respective libraries;

2 Each Name-of-Conference was rendered in three different forms:

21 As given in the title page of the document

concerned;

22 According to the existing prescription in S R Ranganathan's Classified catalogue code, Ed 5 (1964); and

23 According to the implications of the Canon of Recall Value;

3 Each Name-of-Conference rendered according to 22 and 23 was listed in parallel columns in a sheet to constitute a questionnaire (See Specimen in Sec 81);

4 A brief note explaining the objective of the experiment and what each reader involved in the survey was required to do, formed a sort of covering letter to the questionnaire mentioned in category 3 above (See Specimen in Sec 82);

5 The person conducting the survey met each reader separately, explained the objective of the survey, and gave him a copy of the questionnaire;

6 When the questionnaire was not returned by a reader on or before the date stipulated for the purpose, the librarian reminded him and a short grace period was allowed for return of the questionnaire; and

7 The completed questionnaire sheets were forwarded to DRTC.

A similar procedure was followed by the SIS Library in regard to the names of other kinds of Corporate Bodies included in its survey.

4 FINDINGS OF SURVEY

41 Name-of-Conference

411 Number Surveyed and Replies Received

SN	Particulars	Institution			Total
		SIS	Poona Univ	NAL	
1	N of Names of Conferences used in the survey	1	20	20	41
2	N of Readers surveyed	25	13	28	66
3	N of Readers responding	22	12	28	62

412 Analysis of Preference

SN	Institution	Total N of replies	N preferring entry according to		$\frac{e \times 100}{c}$
			Existing Method	Canon of Recall Value	
a	b	c	d	e	f
1	School of I S	22	8	14	64
2	Poona Univ	240	80	160	67
3	N A L	560	40	520	93
	Total	822	128	694	84

42 Other Corporate Bodies

As has been mentioned in Sec 2, only the Library of the School of International Studies had included names of other corporate bodies in the survey. Data on the findings are given below:

421 Analysis of Preference

Number of Names of Corporate Bodies used in survey	Total Number of replies	Number preferring entry according to		$\frac{d \times 100}{b}$
		Existing Method	Canon of Recall Value	
a	b	c	d	e
11	232	100	132	57

5 COMMENT BY READERS

Some of the readers who replied to the questionnaire made brief comments indicating the reasons for their preference of the form of rendering according to the Canon of Recall Value. In general, the main reason was that they were more likely to remember the term denoting the subject of purview or sphere of work of the corporate body concerned than the terms denoting other ideas.

A few of the readers who preferred the form of rendering of the name of a corporate body according to existing cataloguing rules, giving rise to a form of heading, in some cases, not in conformity with the

Canon of Recall value, also offered comments indicating the reasons for their preference. In general, the main reason was that they were accustomed to a particular form of rendering, and in citations or bibliographical references names of corporate bodies etc are rendered in a form different from that prescribed by the Canon of Recall Value. Therefore, they might find it difficult to reconcile the different practices.

6 FURTHER WORK

It will be helpful if a larger number of surveys are carried out in different libraries to collect adequate data on readers' reactions to the form of rendering of names in headings implied by the Canon of Recall Value. An objective of this short report on the findings of the surveys in three libraries is to stimulate other libraries to carry out similar experiments. It is quite possible that some libraries have already recognised certain inadequacies arising from the present method of rendering of name of corporate bodies. For example, it may be mentioned here that in the NAI, even before the formulation of the Canon of Recall Value, the difficulty of readers and librarians in searching for Proceedings of Conferences in the catalogue, which has entries according to the prescriptions of existing cataloguing code, was sensed. An attempt was made to choose the term denoting the subject forming the purview of the conference as Entry Element in the Heading.

7 ACKNOWLEDGMENT

The DRTC faculty thanks the librarians who have carried out the surveys, the findings of which have been reported in this paper. Thanks are also due to the heads of the libraries where the surveys were carried out.

8 SPECIMEN

81 List of Names of Conference

SN	Heading According to	
	Existing Practice	Canon of Recall Value
1	SYMPOSIUM ON CRACK PROPOGATION	CRACK PROPOGATION (Symposium on –)
2	INTERNATIONAL SYMPOSIUM ON FRACTURE MECHANICS	FRACTURE MECHANICS (International symposium on —)
3	SYMPOSIUM ON NUMERICAL APPROXIMATION	NUMERICAL APPROXIMATION (Symposium on –)
4	SYMPOSIUM ON PLASMA SPACE SCIENCE	PLASMA SPACE SCIENCE (Symposium on —)
5	INTERNATIONAL SYMPOSIUM ON ERGODIC THEORY	ERGODIC THEORY (International symposium on —)

82 Explanatory Note (Issued by the NAL Library)

"1 The volume of "Proceedings of conferences" are important sources of information for scientists. They contain articles on recent research work, and reports of the ideas exchanged at the conference. For quick search and selection of these publications, they have to be adequately classified and catalogued. In these processes, the readers' approaches to the documents should naturally be kept in mind.

2 The word or word-group in the title of a volume of a conference proceedings, which a reader is likely to recall when searching for the proceedings is to be used as a Heading in the catalogue entry.

3 The titles of the Conference Proceedings are usually long. It has been found that a majority of readers do not recall all the words in the title and still less in the sequence in which they occur in the title.

4 This has been a problem in providing maximum facility to the majority of readers through the entry for conference proceedings in the Library Catalogue. The method of entry -- particularly in making the heading in the catalogue -- until recently, has not been helpful to a majority of readers. This inadequacy has been recognised in some of the surveys of readers' reaction to the use of Library Catalogue.

5 Recently a new approach to the solution of this problem has been formulated. This is based on the Canon of Recall Value. The Canon itself has its roots on the psychology of memory.

6 In May 1970, a Seminar on this subject

was held in the Documentation Research and Training Centre. Delegates from NAL Library also participated in this seminar. A request was issued at the seminar to conduct surveys of the readers' approach to the names of corporate bodies, conference proceedings, etc, in different institutions. The present survey by the NAL Library is in response to the request.

7 In the chart in the attached sheet, col 2 gives the heading of the Conference Proceedings in the catalogue entry according to the present practice; and col 3 gives the heading of the Conference Proceedings according to the suggested new practice. We would very much appreciate if you will kindly mark off the particular method of rendering of the name you think will be more helpful to you in remembering and recalling the name of the conference while scanning the catalogue. It is possible that there may be other approaches, such as by the name of the corporate author, short title, etc. These will get cross-reference entries.

8 It will be a help if you return the marked sheet to the Library on or before ... . Any suggestions regarding the method of entry may also be sent along with the sheet.

Thank you for the cooperation."

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FORMATION OF BASIC SUBJECTS AND ISOLATES IN SOCIAL SCIENCES.

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The Main Subjects into which the subject Social Sciences gets fissioned are enumerated. Illustration is given, of the Fission of some of these Main Subjects into Basic Subjects and Compound Basic Subjects, of the mode of Lamination giving rise to Compound Subjects in Social Sciences, the formation of Compound Isolates, Complex Isolates, and Complex Subjects in Social Sciences. Wherever possible, the examples carry the CC Number and UDC Number as a basis for comparative study.

1 SOCIAL SCIENCES: A PARTIAL COMPREHENSION

Nowadays "Social Sciences" is regarded as a partial comprehension of some of the Main Subjects enumerated in most schemes for classification. These form one of the groups in the Universe of Subjects. The other groups are "Natural Sciences" and "Humanities".

2 FISSION OF SOCIAL SCIENCES INTO MAIN SUBJECTS

The Main Subjects into which Social Sciences get fissioned in CC and UDC, are given in the tables

1 and 2. "Library science" and "Management theory" are omitted.

21 Sequence in CC

The following table gives the sequence of the Main Subjects fissioned out of Social Sciences, according to CC (Ed 7 in preparation). The UDC and CC Numbers are also given for convenience of reference.

Table 1. Main Subjects in CC Sequence

SN	UDC N	CC N	Main Subject
1	3+9	SZ	Social sciences (Partial comprehension)
2	37	T	Education
3		TT	Educametry
4		TX	Education psychology
5	9	TZ	Geography and History (Partial comprehension)
6	91	U	Geography
7	32+33+931/99	UZ	History, Political Science, and Economics (Partial comprehension)
8	33+931/99	UZZ	History and Economics (Partial comprehension)
9	931/99	V	History
10	930	VX	Historical sources (Theory and method)
11	32	W	Political science
12		WX	Geopolitics
13	33+380/382	X	Economics
14		XT	Econometry

CSI

SN	UDC N	CC N	Main Subject
15		XV	Economico-cybernetics
16		XX	Industrial economics
17	30	Y	Sociology
18	31	YT	Sociometry
19		YV	Socio-cybernetics
20	36	YX	Social work
21	34	Z	Law

22 Sequence in UDC

The following table gives the sequence of the Main Subjects fissioned out of Social Sciences, according to UDC. The CC and UDC Numbers are also given for convenience of reference.

Table 2. Main Subjects in UDC Sequence

SN	CC N	UDC N	Main Subject
1	SZ	3+9	Social sciences (Partial comprehension)
2	Y	30	Sociology
3	UZ	32+33+931/99	Political science, Economics, and History (Partial comprehension)
4	W	32	Political science
5	UZZ	33+931/99	Economics and History (Partial comprehension)
6	X	33	Economics

SN	CC N	UDC N	Main Subject
7	Z	34	Law
8	YX	36	Social work
9	T	37	Education
10	TZ	9	Geography and History (Partial comprehension)
11	U	91	Geography
12	VX	930	Historical source (Theory and method)
13	V	931/99	History

23 Fused Main Subject in CC

The following Main Subjects enumerated in CC do not occur as Main Subjects in UDC: Educametry, Educational psychology, Geopolitics, Econometry, Economico-cybernetics, Industrial economics, and Socio-cybernetics. These subjects are all Fused Main Subjects. Their inclusion among the Main Subjects in CC is due to efflux of time, and the notational system of CC having the capacity for fixing a number for them in the Array of Main Subjects, with the aid of Emptying Digits.

24 Main Subjects in UDC

The Main Subjects in UDC are taken from the Second Order divisions, except that "History", and "Historical source" are taken from Third Order divisions. The new Fused Main Subjects enumerated in the array of Main Subjects of CC should be conceded in the Idea Plane by all schemes of classification. But the notational system of UDC stands in the way of their being enumerated among its Main Subjects.

3 FISSION OF MAIN SUBJECTS INTO NON-MAIN BASIC SUBJECTS

31 Example

The following table arranges the Basic Subjects fissioned out of "Economics" according to CC:

SN	UDC N	CC N	Basic Subject
1	33	X	Economics
2	339.4	X1	Consumption
3		X11	Want
4		X16	Standard of living
5	339.32	X17	National income
6		X171	Percapita income
7	339.1	X2	Resources
8	339.2	X3	Distribution
9		X3A	System (Illustrative)
10		X3N	Social credit
11	338.5	X4	Value
12		X41	Utility
13		X416	Margin of utility
14	338.51	X42	Supply and demand
15		X421	Supply
16		X422	Demand
17		X43	Laissez-faire
18	338.97	X44	Business cycle
19	338.974	X442	Depression
20		X443	Normal
21	338.973	X444	Boom
22	338.98	X45	Artificial control
23		X453	Unofficial
24		X455	State
25	338.52	X46	Price

SN	UDC N	CC N	Basic Subject
26	332.7	X5	Trade
27	332	X6	Private finance
28	332.4	X61	Money
29	332.1	X62	Banking
30	332.6	X65	Investment
31	336	X7	Public finance
32	336.1	X71	Budget
33		X712	Deficit
34		X713	Balanced
35		X714	Surplus
36	336.2	X72	Tax
37	336.3	X76	Public loan
38		X77	Income
39	368	X8	Social finance
40	338.964	X9B	Microeconomics
41	338.963	X9C	Medium scale
42	338.962	X9D	Macro economics
43	338.952	X9F	Private enterprise
44		X9G	Public utility
45		X9H	Public enterprise
46		X9J	International enterprise
47		X9L	By Environment (Illustrative)
48		X9V	War economics
49		XA	System (Illustrative)
50	334	XM	Cooperation

32 Colon Classification

In CC, Main Subjects can be fissioned into Basic Subjects on the basis of the concepts Canonical

Divisions, Specials, Environmented Divisions, and Systems. All Main Subjects but "V History", "W Political Science", "Y Sociology", "YX Social Work", and "Z Law", among the older Main Subjects admit of Fission into Non-Main Basic Subjects. With regard to the new Main Subjects formed by Fusion, experience has not yet been gained.

33 Universal Decimal Classification

In UDC, the methods of Fission of a Main Subject into Non-Main Basic Subjects do not appear to be recognisable -- at least in a clear way.

34 Cause of Difference

The difference between CC and UDC in the recognition of the Fission of Main Subjects, is due to the current advance in the Theory of Classification. In the Idea Plane, Fission of Main Subjects is easily recognised, in general, though not fully so in "Economics". In the Notational Plane, CC has the necessary means of accommodating the Non-Main Basic Subjects with distinctly recognisable Basic Subject Numbers. But the Notational System of UDC does not admit of it.

4 COMPOUND SUBJECTS BY LAMINATION

41 Lamination in CC

The term 'Lamination' denotes the mode of forming Compound Subjects going with any Basic Subject. As a result of Lamination, a Compound Subject consists of a Basic Facet and one or more Isolate Facets.

This is true in all the Social sciences.

42 Five Fundamental Categories

According to the theory in the Prolegomena, each isolate facet may be deemed to be a manifestation of one and only one of any of the Five Fundamental Categories: Personality, Matter, Energy, Space, and Time (PMEST). This finding in the theory is implemented in CC. Of these, the Time and Space isolates are Common Isolates. There are schedules of Time and Space Isolates, in CC as well as in UDC, for use in Lamination. The other three classes of isolates can be special to a Basic Subject. Of these, Energy denotes "Action". There are usually very few isolates enumerated in the Schedule of (E) isolates. (M) isolates may consist of Property, Method, or Material. Usually there are schedules of spe[illegible] isolates for each of these. It is not difficult to recognise them in any Compound Subject.

43 Personality Isolate: Conceptual Only

The recognition of (P) isolates is not easy in the Social sciences. They are easily recognised in any subject in the Natural sciences, because, a (P) isolate in these subjects has a **perceptual** form which can be identified by the primary senses bare or aided by instruments. But, this is not so in any subject in the Social sciences. In any such subject a (P) isolate has no perceptual form; it has only a conceptual one. However, with some experience and careful thinking a Social Form can be recognised by the intellect. The following table shows such conceptual Personality Forms in some of the subjects of the Social sciences.

SN		Basic Subject	Manifestation of (P)
1	T	Education	Educand group
2	U1	Mathematical geography	Representation
3	U2	Physical geography	Physical feature
4	U3	Biogeography	Organism
5	U4	Anthropogeography	Distribution
6	U5	Political geography	International factor
7	U7	Economic geography	Route
8	V	History	Community
9	W	Political science	Type of State
		... ...	...
10	XX	Industrial economics	Industry
11	Y	Sociology	Social group
12	YX	Social work	Social group
13	Z	Law	Community

Note.- The (P) isolates for the Basic Subjects going with the Main Subject "X Economics" have not yet been finalised for Ed 7 of CC, except for certain Canonical Divisions.

44 Facets in UDC

UDC provides schedules for special (E), (M) -- Property or Method --, and (P) isolates in some cases. The indicator digits used for them are "-" (hyphen) and ".0" (point zero). The facets introduced by them are called Analytical Divisions. But the same indicator digits are used for all the three kinds of facets [E], [M], and [P]. For example, we have the following in the schedule of analytical divisions provided under "37 Education", implying that they can be applied to any normal division of 37. Special divisions with ".0" as Connecting Digit:

Fundamental Category (M)-Method	Fundamental Category (P)	Fundamental Category (E)
.03 Cultivation of the Personality: Cultural, Social, Civic, Creative etc.	.04 Education with reference to the pupil	.048 Vocational guidance etc.

45 Levels of Personality Isolate

The Organs of a (P) are also deemed to be manifestations of Personality of the second level. For example, among the schedules of isolates likely to occur in Compound Subjects going with "V History", CC gives two schedules of (P). An illustrative extract from each of them is given below:

1 Schedule of (1P1) [First round first level Personality]. Community isolates		2 Schedule of (1P2) [First round second level Personality]. Organ isolates	
44	India	1	Head
56	UK	2	Executive
73	USA	3	Legislature

With these two schedules, we can construct the following Class Numbers, involving different levels of [P].

The examples show also [M] -- Property --, and [T].

V,44,1;3'N7	History of the functions of the President of India brought upto 1970s
V,56,2;3'N7	History of the duties of the Cabinet of UK brought upto 1970s
V,73,3;2'N7	History of the Constitution of the Congress of USA brought upto 1970s

These examples show incidentally the various modes in which a Compound Subject may be formed in Social sciences as in the other groups of subjects. In a Compound Subject going with the Main Subject "Z Law", the identification of the Community Facet as a manifestation of (P) is easy. But, it is not so easy to determine the Fundamental Category of which each of the other Facets may be deemed to be manifestation. They are taken to be successive levels of (P).

5 COMPOUND BASIC SUBJECT

The subjects in Social sciences admit of the formation of Compound Basic Subjects, even as the subjects in the other groups. A Compound Basic Subject is formed by the combination of a Canonical Division, a Specials Division, an Environmented Division, and a System Division, taken two or more at a time, with the Host Main Subject prefixed to them. The sequence of the components is the reverse of the sequence in the schedule.

Example:

The following table gives the sequence of all Simple and Compound Basic Subjects going with "X Economics". The UDC Number is given in the second line of each example.

1 Y Economics
33
2 X3 Distribution
339.2
3 X9X1 Economics of developing countries
33(1-77)
4 X9X1-3 Distribution in developing countries
339.2(1-77)
5 XM Cooperative system of economics
334
6 XM-3 Distribution in cooperative system of economics
334:339.2
7 XM-9X1 Cooperative economics of developing countries.
334(1-77)
8 XM-9X1-3 Distribution in developing countries with the cooperative system of economics
334:339.2(1-77)

It may be noted that in CC the digit "-" (hyphen) is used as an Indicator Digit between the different components of a Compound Basic Subject.

In UDC, the documents dealing with the economics and its Compound Subjects of developing countries will not come together. In fact, the numbers with the geographical facet really represent only a descriptive account of economics or of a compound subject of economics in developing countries. But, it cannot be taken to stand for the specific shape of the Economics and all its subdivision peculiar to developing countries.

6 COMPOUND ISOLATE

The subjects in Social sciences admit of the formation of Compound Isolates even as the subjects in the other groups. A Compound Isolate is formed by the combination of two or more isolates in one and the same schedule. In CC the Indicator Digit "-"(hyphen) separates the two component isolates. The isolate coming later in the schedule is used as the earlier component of the Compound Isolate.

Example:

Y,31-15	Sociology of Rural Women
Y,35-15	Sociology of City Women

7 COMPLEX ISOLATE

The subjects in Social sciences admit of the formation of Complex Isolate as well as a Complex Array Isolate even as the subjects in the other groups. A Complex Isolate is formed using one of the isolates in a schedule as the First Phase and another isolate in the same schedule as the Second Phase. A Complex Array Isolate is formed using one of the isolates in the last Array of a schedule as the first phase and another Array Isolate in the same Array. CC gives a schedule of different possible Phase Relations. The Indicator Digit to be inserted before a Phase Relation Number is "&" (ampersand). The following example illustrates a Complex Array Isolate.

Y,31&w5 Difference of rural folk and city folk.

8 COMPLEX SUBJECT

The subjects in Social sciences admit of the formation of Complex Subjects, even as the subjects in the other groups.

Example: Y,15;354&gT Influence of education on the superstition of women

DRTC Seminar (8)(1970). Paper BB.

COMPARISON OF "SUBJECT" WITH "SYSTEM".

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The general characteristics of a subject as represented in the Generalised Facet Structure based on the General Theory of Classification of Ranganathan and those of a System as represented in the General Systems Theory developed by von Bertalanffy, Hall and Fagen, Boulding, Khailov and others, are compared. In particular, the structuring of a subject, modes of formation of subjects, and patterns of growth in the universe of subjects are considered. The helpfulness of the comparative study is pointed out

0 SCOPE OF THE PAPER

The Generalised Facet Structure (8) based on the General Theory of Classification of Ranganathan (7) is a model for structuring in a helpful way any subject in the universe of subjects. Such a structuring endows the representation of subjects with attributes of a "System" as generally conceived of and used in General Systems Theory (=GST) in Systemology. This paper examines, with illustrative examples, some of the similarities between the concept of "subject" and of "system". The usefulness of recognising the similarity between them in the study of the structure and development of the universe of subjects is also pointed out.

Comparison of "Subject" with "System" BB12

1 SIMILARITY OF IDEAS

11 "Subject" and Document Finding System

In a library readers seek information about a "subject". The system for document finding -- that is, the library's service and its methods, tools and techniques -- is designed to make the search and selection of relevant subjects to meet each reader's need efficient, convenient, and economical. Thus, the concept of "subject" is basic to library service. That is, a study and an understanding of the attributes of "subject" is pre-requisite to the proper design of any system for document finding. The attributes of "subject" and of the universe of subjects usually considered relevant in such a study are:

1 Structure of subject;
2 Development of the universe of subjects; and
3 Organisation in the universe of subjects as a whole.

12 "System" and General Systems Theory

The concept of "system" is basic to research in Systemology. That is, a study and an understanding of the attributes of "system" is considered prerequisite to the formulation and development of a General Systems Theory. The attributes of "system" usually considered relevant in such a study are:

1 Structure of system;
2 Developmental attributes of system; and
3 Organisation of systems.

Thus, there is a similarity between the role of the concept of "system" in General Systems Theory and that of "subject" in systems for document finding. Therefore, it would be helpful to examine the similarity in greater depth and detail. Such a study could indicate the potential helpfulness of the methodology and techniques derived from General Systems Theory in the study of the structure and development of the universe of subjects.

2 DEFINITION

The following definitions (7) of a few technical terms would be helpful in the discussion.

21 Idea

An idea is a product of thinking, reflecting, imagining, etc, got by intellect by integrating with the aid of logic, a selection from the apperception mass and/or what is directly apprehended by intuition, and deposited in memory.

22 Subject

The concept of "subject" used in this paper is more or less the same as that expounded according to the General Theory of Classification of Ranganathan (7) and represented according to the model Generalised Faceted Structure (8) based on this theory.

23 Isolate Idea

An Isolate Idea is any idea or idea-complex fit to form a component of a subject, but not by itself fit to be deemed to be a subject.

24 Basic Subject

A Basic Subject is a subject without any isolate idea as a component.

25 Compound Subject

A Compound Subject is a subject with a Basic Subject and one or more isolate ideas as components.

26 System

The concept of "system" used in this paper is more or less the same as that expounded by von Bertalanffy, Hall and Fagen, Boulding, and Khailov and others (1). In particular, the definition and attributes of "system" used are from the writings of these authors. (See Sec 3).

27 Environment

For a given system, the environment is the set of all entities, a change in whose attributes affect the system and also those entities whose attributes are changed by the behaviour of the system.

3 GENERAL COMPARISON OF "SYSTEM" AND "SUBJECT"

The general characteristics of a "system" and of a "subject" are presented in parallel columns in the following chart. The statement about the characteristics and the annotation are essentially based on the definition and exposition of "subject" by Ranganathan and of "system" by Bertalanffy and others, referred to in Sec 22 and 26 respectively.

System	Subject
1 A system is a set of entities (components) together with relationships between them and between their attributes.	1 A subject is a systematised body of ideas, whose extension and intension are likely to fall coherently within the field of interest and confortably within the intellectual competence and field of inevitable specialisation of a normal person. The totality of such subjects forms the universe of subjects.
Annotation	Annotation
11 The essence of the different definitions of system is the coupling among the component entities and the resulting helpful structuring of the system.	11 The essence of the definition of subject is the coupling among the component ideas and the resulting helpful structuring of the subject.
12 Components of a system are unlimited in variety. They include concrete entities, such as chemical element, spring, switch, neuron, gene, plant, animal, human being, and social group as well as abstract ones, such as mathematical variable, equation, process, value, and principle.	12 Ideas forming components of subject are unlimited in variety. Any idea about a concrete or abstract entity can be a component of a subject. Similarly, subjects forming components of the universe of subjects are unlimited in variety.
13 Attributes are properties of entities. An entity is ultimately specified by its attributes.	13 An idea denoting an attribute is deemed as a property in the context of a subject.

System	Subject
14 Relationships bind the components together and make the concept of System helpful.	14 Relationships bind the component ideas together and make the concept "systematised body of ideas" helpful. The systematisation is consistently obtained by implementing the postulate that the Facet Syntax should approximate the Absolute Syntax of Ideas.
15 The relationship to be considered among a given set of components depends upon the context. Usually, helpful relationships are chosen, the helpfulness being determined with respect to the interest of the user of the system.	15 The relationship among the component ideas of a subject to be considered depends upon the context. Usually, helpful relationships are chosen, the helpfulness being determined with respect to the interest of the specialist user. This is true also of the arrangement of different subjects in the universe of subjects in a helpful sequence.
16 An abstract system constitutes a model.	16 The Generalised Facet Structure is a model for representing a subject -- its components and their interrelations.
2 A system may be subdivided into sub-systems. The elements of a system may each constitute a	2 A subject may be subdivided into different facets. The facet of a subject may itself be

	System		Subject
	system of a lower order. This is referred to as an hierarchical order of systems.		considered as a system of lower order. Similarly, the universe of entities, the universe of knowledge, the universe of subjects going with a particular Basic Subject, and a subject having a particular Basic Subject, form a hierarchy.
	Annotation		Annotation
21	The properties of a subsystem may not be completely analogous with those of the original system.	21	The properties of any one chunk of the universe of subjects mentioned above, may not be completely analogous with those of the universe of subjects of a lower order in the hierarchy.
22	Objects belonging to one subsystem may be considered as part of the environment of another subsystem.	22	Each chunk of the universe of subjects may have other chunks as part of its environment. Also, the universe of subjects embodied in the documents in a library, have the potential queries as a part of its environment.
23	A system together with its environment may make up the universe of all things of interest in a given context. Subdivision of this universe into subsystems and environment, can be done in several ways depending	23	A subject together with its environment -- that is, the umbral and penumbral subjects -- make up the field of interest to a reader at a given moment. Subdivision of a universe of subjects can be done according

	System		Subject
	on the helpfulness to the one studying the particular universe.		to the helpfulness to the user. For example, a particular isolate idea may be of dominant interest to a reader at a given moment.
3	In a centralised system one component plays a dominant role in the working of the system. The system is said to be centred round this Leading Part.	3	The representation of a subject according to the Generalised Facet Structure may be considered as a centralised system. In Compound Subjects having a particular Basic Subject, the Personality Isolate is the Leading Part. It generally determines the other special isolate ideas likely to occur as components in the subject.
	Annotation		Annotation
31	A small change in the leading part may be reflected throughout the system causing considerable change.	31	A change in the Personality Isolate can lead to considerable change in the denotation of ideas by the particular structuring of the subject. (See examples 11 and 12 in Sec 51).

4 RIGOROUS STUDIES NEEDED

In Sec 3 we have noted some similarity between certain general characteristics of the concept of "system", as used in General Systems Theory and those of "subject" as represented in the Generalised Facet Structure based on the General Theory of Classification. During the last two decades several lines of approach and different methodologies are being examined for the formulation and development of a General Systems Theory. For example, cybernetics and the related information theory, topology and the related network theory, and decision theory and the related game theory, have been used in the formulation of a Theory of Organisation. At the present stage it may be difficult to apply all these methodologies in the study of the structure and development of the universe of subjects. The Classification Research Group (UK) has attempted to apply the concept of "organised complexity" and "integrative levels", for example, in breaking the universe of subjects in the first instance, into a few convenient chunks and arranging them in a helpful sequence. However, it is now difficult to decide which of the methodologies of systems research are likely to be of practical help in the study of the attributes of the universe of subjects.

5 ATTRIBUTES RELATING TO DEVELOPMENT AND STRUCTURE

51 Scope for Investigation

Nevertheless, there is scope, even at present, for the study of the "Growth" properties of the universe of subjects using techniques similar to those used in Systemology. In the succeeding sections a few properties associated with structure and growth in general are mentioned. This is followed by a brief mention of a few kinds of studies of growth of potential use in the study of the development of the universe of subjects.

52 Coherence

A system is said to behave as a whole or coherently, if every component of the system is so related to every other component that a change in a particular component causes change in all other components and in the total system. Generally, the term 'System' is used only when some degree of coherence or wholeness exists in the system.

521 Example from the Universe of Subjects

1 In a Compound Subject having a particular Basic Subject, if the Basic Subject component is changed, the subject denoted by the totality of the component ideas in it may be completely different. The following compound subjects illustrate this:

1 Medicine, Child - Blind
2 Psychology, Child - Blind
3 Education, Child - Blind
4 Sociology, Child - Blind

2 In a Compound Subject, the interchange of the position of a component idea with another in the facet structure changes the denotation of the subject because of the change in the relation between the components. The following examples illustrate this:

11 Commodity Production Engineering, Engine - 30 horse power - Motor car

12 Commodity Production Engineering, Motor car - Engine - 30 horse power

The structuring of the component ideas in example 11 denotes the subject "Production of 30 HP engine for use in motor car", whereas that in 12 denotes the subject "Production of motor car with a 30 HP engine".

Similarly, the combination of ideas

21 Bacteria : Destruction, Paint

22 Paint : Destruction, Bacteria,

denote different subjects.

53 Independence

If the change in a part of a system depends on or effects only that part, it is called Independence or Physical Summativity. The component parts hang together in a loose manner, as it were. Such a system is also called a Degenerate System.

531 Example from the Universe of Subjects

The change of a component idea in a subject, which itself is a component of a Subject Bundle may not appreciably affect the other subjects constituting the Subject Bundle. The Subject Bundle "Soil Science" may have component subjects such as Soil Physics, Soil Engineering, Soil Chemistry, Soil Biology and Soil Microbiology. A change in or addition of, an isolate idea to the subject Soil Microbiology is not likely to affect appreciably the structuring of the subjects in Soil

Physics, Soil Chemistry, Soil Engineering, and Soil Biology.

A similar attribute can be thought of in relation to the component subjects forming a Complex Subject and also of the component subjects forming a Bundle of Subjects

54 Progressive Segregation

Kind 1.- If the changes in the components of a system lead to a gradual transformation, with time, from coherence to independence, the system is said to undergo Progressive Segregation of Kind 1.

541 Example from the Universe of Subjects

The separation from a larger chunk of the universe of subjects a smaller chunk and the latter forming an independent discipline is an example. The progressive separation of Psychology from Philosophy is illustrative of this.

Kind 2.- If the change in a system is in the direction of increasing division into subsystems and further division of sub-system into sub-subsystems, or of differentiation of function, the system is said to undergo Progressive Segregation of Kind 2. This property corresponds to the idea of "Growth".

542 Example from the Universe of Subjects

A Main Subject may divide, by fission, into several Basic Subjects. Each of the Basic Subjects may fission into further Basic Subjects. The subjects going with each or some of the new Basic Subjects may require differentiated schedules of isolates. The fission of the Main Subject Mathematics into several Basic Subjects -- such as Arithmetic, Algebra, Analysis, Trigonometry, and Geometry -- and the fission of each of the Basic Subjects into further Basic Subjects, with a differentiated schedule for some of the Basic Subjects, is illustrative of this. Such a fission process can also occur in the case of an isolate.

55 Progressive Systematisation

In this process the change is towards coherence or wholeness. It is thus opposite of Progressive Segregation. This may result from:

1 Strengthening of pre-existing relation among the parts of the system; or

2 Development of relation among parts previously unrelated; or

3 Gradual addition of parts and relations to a system; and

4 Combination of these changes.

551 Example from the Universe of Subjects

1 Two subjects going with different Basic Subjects may first be studied in mutual relation to each other. This gives rise to a Complex Subject with a Phase Relation between the subjects involved. The formation of the Complex Subject is said to

be by Loose Assemblage. The relation between the subjects may gradually change to a facet relation, that is, to one of greater strength of bond. Subsequently, there may be a further strengthening of the bond such that one of the subjects may form a subdivision of the other. The view about the development of Biochemistry until recently, was in conformity with these stages of association between the subjects Biology and Chemistry (6).

2 Intra-facet relation and intra-array relation are examples of Progressive Systematisation due to cause 2. Other kinds of "inter-disciplinary relation" can also be recognised.

3 The accommodation of new isolate ideas, speciators, and new Basic Subjects among the existing ones is an example of Progressive Systematisation due to cause 3.

56 Concurrent Segregation and Systematisation

In one and the same system, there may be Progressive Segregation and Systematisation. This may sometimes occur even simultaneously.

561 Example from the Universe of Subjects

The formation of a Fused Main Subject with schedules of its own, differentiated from those for the component Main Subjects that have fused, is an example of the process.

In Sec 551 we have mentioned Biochemistry as an example of Progressive Systematisation. Biochemistry is now deemed a Fused Main Subject -- fusion of the Main Subjects Chemistry and Biology -- requiring a schedule of its own more or less independent and differentiated from those for the two subjects that have fused. In this new status Biochemistry forms one of the divisions of Molecular Biology.

The formation of a Distilled Main Subject with a schedule of its own more or less independent and differentiated from those for the subjects in which the idea forms a component isolate denoting a practice-in-action. Management Science, Laboratory Technique, and the Pure Science of Archives are examples of such a formation.

6 STUDY OF GROWTH

61 Growth-in-Time

Similarity in the pattern of growth has been observed in different systems. For instance, exponential and logistic patterns have been recognised in the increase of knowledge about animal species, the number of publications on specific subjects such as on Drosophila, Laser, Computer Technology, and Particle accelerators. De Solla Price has proposed different growth patterns in different areas and the relation of the pattern to social factors, research environment etc. A few studies on the pattern of growth of significant ideas in some fields have been reported from this Centre. The similarity of growth pattern in different fields of knowledge has led

Boulding and Keiter to suggest a General Theory of Growth.

62 Growth Rate

Isenson has pointed out that the rate of growth of knowledge can be expressed as an equation embodying a number of limiting factors. Some helpful techniques for this come from the field of technological forecasting (2). Lenz has shown that the exponential growth curve is similar to growth of biological population under constraint. This accounts for the S-shaped logistic growth noted in the increase of knowledge in different fields. A pattern of discovery and duplication in a particular field has been reported from this Centre (4,5). Hartman pictures scientists and engineers as surrounded by an ocean of information, and considers the information as a necessary input for the creation of new ideas. He writes: "Occasionally a bit of information collides with a scientist or engineer, sometimes triggering a new idea and sometimes not. Because it is impossible to predict what piece of information will collide with which scientist and whether a particular collision will be 'elastic' or 'inelastic' the process is only statistically definable". In forecasting the trends in technological subjects, it has been suggested that a model can be derived directly from the Boltzman equation (3).

63 Relative Growth

Another attribute of interest is relative growth of components within a system. A simple relation of allometric increase has been observed in different systems and their respective components. Interesting features of the relative growth patterns between total number of discoveries, duplications, and of new discoveries have been noted (under publication). In compound subjects going with a particular Basic Subject, it would be helpful to study, for example, the relative rate of growth between the totality of different isolate ideas in the field and that of each of the component facets, particularly the Personality facet, and the Matter facet. The relative rate of growth between these components would also be helpful. For example, in the field of Medicine, the rate of growth of new ideas constituting the Personality facet (that is, human organs) is small as compared to the rate of growth of ideas constituting the Matter facet (that is, about anatomy, physiology and diseases and methods of treatment of diseases). This is so because, there is relatively little change over time in the number and kinds of human organs. As compared to this pattern, we find the number of new ideas constituting the Personality facet of subjects going with the Basic Subject Commodity Production Engineering, or Commodity Production Technology increases at a fast rate. These ideas in the Personality facet are about man-made commodities. There are subjects such as Chemistry in which the Personality isolates represent ideas about natural objects and man-made objects. Thus, the rate of growth in this field may be intermediate between the two systems mentioned above. In the Personality isolates in Education and Sociology, we find rapid growth in the number and variety of speciators derived on the basis of different characteristics.

7 CONCLUSION

Some of the documents cited in the Bibliographical References mention, in a general way, the different kinds of growth properties and methods of studying them. It would be helpful to examine their helpfulness in the study of the development of the universe of subjects. The findings about the growth rate and growth pattern would be helpful to the classificationist in making provision for the accommodation of new ideas in different facets in different subjects. Information about the trends in subjects is, of course, useful also in book selection, reference service, and documentation.

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NEW BASIC SUBJECTS, PARTIAL COMPREHENSIONS, AND SUBJECT BUNDLES: COMPARISON OF NATURAL SCIENCES AND SOCIAL SCIENCES.

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The need for the study of the developments in the Universe of Subjects by librarian is emphasised. Examination of the changes in a general scheme for classification necessitated by the developments in the Universe of Subjects is suggested as a method of studying such developments over a period of time. The emergence of new Basic Subjects, Partial Comprehensions, and Subject Bundles, during the last decade, in the Natural sciences and the Social sciences, as sensed in revising Colon Classification Ed 6, in preparing Ed 7, is reported upon. The significant features of the growth in the Natural sciences and Social sciences are noted. The facility of the Notational System of the Colon Classification in accommodating these developments is mentioned.

Abbreviations used

(BS) = Basic Subject CC = Colon Classification

1 INTRODUCTION

11 Study of the Universe of Subjects

Library service is essentially the search and selection of subjects embodied in documents to meet the reader's requirements to the satisfaction of the Laws of Library Science. Therefore, the study of the attributes of subjects embodied in documents is a prerequisite to the design of an efficient system for document finding (4). The attributes of the universe of subjects relevant in this context fall in two groups (3)-- namely

1 Its Development; and

2 Its Structure.

12 Development

A study of the development of the universe of subjects may include the study of such attributes as the following:

1 Modes of formation of different kinds of subjects;

11 The frequency of incidence of the different modes at different periods of time;

2 Rate of development in different subject-fields in the Universe of Subjects.

21 Relative rate of development in different subject-fields; and

22 Relative rate of development in the different facets of compound subjects having a particular (BS).

13 Method of Approach

Different methods can be used for studying the development of the universe of subjects. One method is to examine the impact of such development on the work and the tools of the librarian. The basis of this approach is briefly as follows:

The universe of subjects is ever dynamic; therefore, new ideas are being thrown forth constantly. A new idea may be just an isolate idea in the wave-front of thought in a subject, or a new (BS) of one kind or other, or a new speciator. Each of these have to be accomodated helpfully in any general scheme for classification of subjects. Thus, among the tools of the librarian, classification will receive the greatest impact of the developments. This impact is quite perceptible.

14 Scope of the Paper

This paper reports on the emergence of new Basic Subjects, Partial Comprehensions, and Subject Bundles during the last decade, and makes a comparison in this respect, between the developments in the Natural Sciences and Social Sciences. A statistical study about such new subjects, from CC Ed 1 to Ed 7, has been reported earlier (2).

2 PROCEDURE

The experience reported here was gained in the revision of CC Ed 6 (1960), in preparing Ed 7 (1972). New subjects were spotted out by scanning the following publications:

1 British national bibliography;
2 Hawken (R R). Scientific, medical and technical

books published in USA;

3 Cumulative book index; and

4 Subject guide to books in print.

A main entry was prepared on a standard cataloguing slip for each of the documents dealing with a subject going with any new (BS), Partial Comprehension, and Subject Bundle. A similar entry was also prepared for a document dealing with a new isolate going with any of the existing (BS) in CC, Ed 6. Over 12,000 such entries were prepared. These were sorted out according to the (BS).

3 MAIN SUBJECT
(Excluding Distilled and Fused Ones)

31 Enumeration

Necessity was felt, due to literary warrant, for the inclusion of a number of new Main Subjects -- other than Distilled Main Subjects and Fused Main Subjects. A list of these is given below:

Natural sciences

BT	Statistical calculus	GV	Microbiology
BTT	Operations research	LT	Medical technology
BV	Cybernetics	LU5	Public health
BX	Astronomy	LU6	Hospital
CV	Space physics	LU7	Sanatorium
DWB	Draughtsmanship	LY1	Nursing
DX	Chemical engineering	LY7	Anesthesia
GT	Cytology	LYX	Medical jurisprudence
GTX	Histology		

Social sciences

XX Industrial economics

32 Earlier Practice

Earlier, some of these subjects were deemed as compound subjects going with one or the other of the existing (BS). For example, G,11 Cytology, L:14 Hospital, and L:5 Public health. A few were deemed as non-Main (BS). For example, B28 Statistics and B9 Astronomy.. And a few others were formed by Phase Relation. For example, LObZ Medical jurisprudence.

33 Comparison

From the list of new Main Subjects given in Sec 31, it may be seen that the number of new Main Subjects (other than Distilled and Fused ones) is larger in the Natural Sciences than in the Social Sciences. In fact, there is only one such kind of Main Subject in the Social Sciences, as compared to 17 in the Natural Sciences. It is also worth noting that 7 out of the 17 Main Subjects in the Natural Sciences have been contributed by the Medical Sciences. Together with the 3 new Main Subjects in Biology, nearly 60 per cent of the new Main Subjects in the Natural Sciences have come from the Biological Sciences. The emergence of 4 new Main Subjects in the field of Mathematical Sciences is indicative of the considerable development, in the last decade, in such subjects as Statistical calculus, Operations research, and Cybernetics. (See also Sec 44).

4 FUSED MAIN SUBJECT

41 Definition

A Fused Main Subject results from the fusion of two or more Main Subjects or non-Main (BS) in such a way that each of them loses its individuality in respect of the schedules of isolates needed to form Compound Subjects going with it (8).

42 Enumeration

Necessity was felt, due to literary warrent, for the inclusion of a number of Fused Main Subjects. A list of these is given below:

Natural sciences

BYC	Astro-physics	GYV	Biocybernetics
BYE	Astro-chemistry	HUB	Geodesy
BYG	Astro-biology	HV	Geophysics
DV	Engineering cybernetics	HWE	Geochemistry
GWB	Biomechanics	JT	Agrometry
GWC	Biophysics	LYT	Medicometry
GX	Biochemistry	LYV	Medico-cybernetics
GYT	Biometry		

Social sciences

TT	Educametry	XV	Economic-cybernetics
WX	Geopolitics	YT	Sociometry
XT	Econometry	YV	Socio-cybernetics

43 Earlier Practice

Earlier, some of these subjects were deemed as compound subjects going with one or the other of the existing (BS). For example, B9:6 Astrophysics. A few were deemed as non-Main (BS). For example, E9G Biochemistry. And a few others were formed by Tool Phase Relation. For example, G:(B28) Biometry, and H:(C) for Geophysics.

44 Comparison

From the list of Fused Main Subjects given in Sec 42, it may be seen that the number of Fused Main Subjects is larger in the Natural sciences than in the Social sciences. It is also worth noting that both in the Natural sciences and in the Social sciences, a number of Fused Main Subjects have been formed by the Fusion of Statistical Calculus and of Cybernetics with different Main Subjects. It has already been mentioned in Sec 33 that considerable literary warrant has necessitated the deeming of Statistical Calculus and Cybernetics as new Main Subjects. The Fused Main Subjects enumerated in Sec 42 illustrate the increasing literary warrant on the application of Statistical Calculus and Cybernetics in different subject fields (1).

5 DISTILLED MAIN SUBJECTS

51 Definition

A Distilled Main Subject is the result of the evolution of a pure discipline as a Main Subject out of the experiences in its appearance-in-action in diverse Compound Subjects having different Host (BS), or occasionally even with Host Compound

Subjects (7). The subject representing "the experiences in its appearance-in-action" may have Host (BS) from the Natural Sciences alone, or from the Social Sciences alone, or from the Natural Sciences as well as the Social Sciences. The position of a new Distilled Main Subject in the Schedule of Main Subjects depends on this. For example, an idea denoting an experience-in-action having its Host (BS) from the Natural Sciences as well as Social Sciences is placed earlier to the Natural Sciences.

52 Enumeration

Necessity was felt, due to literary warrant, to include a fairly large number of Distilled Main Subjects. The following is a list of them:

Common to Natural Sciences and Social Sciences

5	Exhibition technique
6	Museology
7	Systemology
8	Management science
9b	Career
9c	Meteorology
9d	Standardisation methodology
9e	Specification methodology
9f	Research methodology
9g	Evaluation technique
9p	Conference technique
9s	Seminar technique
9t	Commission technique
9P	Communication theory
9Q	Symbolism

Social Sciences

VX Historial source (As a pure disciline)

53 Comparison

The number of the Distilled Main Subject, arising out of a practice-in-action in the Natural Sciences and the Social Sciences taken together is the largest. At present there is no Distilled Main Subject arising out of a practice-in-action in the Natural Sciences alone. There is only one Fused Main Subject arising out of a practice-in-action in the Social Sciences alone.

6 PARTIAL COMPREHENSION

61 Definition

Sometimes, subjects going with different Main Subjects or (BS) going with a Main Subject are treated integrally or disjunctively in one and the same document. A Partial Comprehension has meaning only with reference to the Main Subjects or Basic Subjects recognised and enumerated in the schedule. What is now deemed a Partial Comprehension might have been a Main Subject earlier, before Fission advanced sufficiently (9).

62 Enumeration

The production of books and periodicals collectively on several subjects, has necessitated the inclusion of a number of new Partial Comprehensions. The following is a list of them:

Natural Sciences

BWZ	Astronomy and astrophysics
CZ	Engineering and technology
DZ	Chemical sciences

FZ	Biological sciences
GVZ	Molecular biology
GZ	Geological sciences
HOZ	Physical geology
HZ	Plant sciences
IZ	Agriculture, Forestry, and Animal husbandry
KZ	Medical sciences
LU5Z	Hospital and sanitorium

Social Sciences

RZ	Behavioral sciences
TZ	Geography and History
UZ	History, Political science, and Economics
UZZ	History and Economics

63 Comparison

As in the case of new Main Subjects (See Sec 32 and 42), the number of new Partial Comprehensions is larger in the Natural Sciences than in the Social Sciences. A majority of the kind of documents that may be deemed as Partial Comprehensions, are Periodicals and Reference Books -- sush as Encyclopaedias and Dictionaries.

7 SUBJECT BUNDLE

71 Definition

For convenience in the organisation of research, the preliminary results and the data obtained in different Basic Subjects or Compound Subjects going with different (BS) involved in the study of some phenomenon or entity are published in one and the same document disjunctively for further investigation and elaboration, independently by the specialist in the respective subjects. Thus, an account of different subjects is brought together out of exigency without any substantial integral account of them. This results in "Subject Bundle" (12).

72 Enumeration

The following is a list of subh Subject Bundles:

A1	Pure science	AM	Earth science
A2	Applied science	AN	Hydro science
A9C	Microtechnique	AP	Ocean science
AC	Surface science	AR	Atmosphere science
AD	Social science	AS	Space science
AE	Material science	AV	Defence science

73 Annotation

A document on a Subject Bundle such as Pure Science, Applied Science, Earth Science, and Defence Science may include documents on subjects going with (BS) in the Social Sciences, though predominantly it would include documents on subjects going with (BS) in the Natural Sciences.

8 NON-MAIN BASIC SUBJECT

81 Enumeration

A Non-Main (BS) may be

1 A Canonical (BS);

2 A Specials (BS); or
3 A System (BS).

. Literary warrant demands the inclusion of a number of new Non-Main (BS) belonging to the three kinds mentioned above. A provisional list of the (BS), to be incorporated in CC, Ed 7, has been published (5). As their number is large -- that is, about 350 --, only the new Non-Main (BS) in the Social Sciences are listed here. Further, the Environmented (BS) are not included in the list because an Environment Division can be attached to any Main Subject or (BS) whenever warranted (6). Further, Systems (BS) are also not included, as they are formed by Chronological Device (11).

U	Geography
U1	Mathematical
U2	Physical
U3	Bio
U4	Anthropo
U5	Political
U7	Economic
U8	Travel

VX	Historical Source (as a pure discipline)
VX1	Archeology
VX2	Epigraphy
VX3	Numismatics
VX44	Heraldry
VX46	Genealogy
VX5	Tradition
VX7	Chronology
VX77	Literature
VX78	Language
VX8	Archive

X	Economics
X1	Consumption
X11	Want
X16	Standard of living
X17	National income
X171	Per capita income
X2	Resources
X3	Distribution

X4	Value
X41	Utility
X416	Margin of utility
X42	Supply and demand
X421	Supply
X422	Demand
X43	Laissez-faire
X44	Business cycle
X442	Depression
X443	Normal
X444	Boom
X45	Artificial control (Planned economy)
X453	Unofficial
X455	State
X46	Price
X5	Trade
X6	Private finance
X61	Money
X62	Banking
X65	Investment
X7	Public finance
X71	Budget
X712	Deficit
X713	Balanced
X714	Surplus
X72	Tax
X76	Public loan
X77	Income
X8	Social finance (Insurance)
X9B	Microeconomics (Small scale)
X9C	Medium scale
X9D	Macro economics (Large scale)
X9F	Private enterprise
X9G	Public utility
X9H	Public enterprise
X9J	International enterprise

XX	Industrial economics
XX9B	Small-scale
XX9C	Medium scale
XX9D	Large scale
XX9F	Private enterprise
XX9G	Public utility
XX9H	Public enterprise
XX9J	International enterprise

82 Earlier practice

Earlier, most of such new Non-Main (BS) were treated as Compound Subjects going with one (BS) or other. Further, there was no provision for the Environmented Divisions. Fifty-six of the non-Main (BS) in Ed 6 are now deemed as Compound Subjects. They are mainly in the Natural Sciences.

83 Comparison

The total number of new Non-Main (BS) in the Social Sciences is 67, as against 168 -- or four times -- that in the field of Natural Sciences. Out of the 67 in the Social sciences, 50 (that is, about 75 percent) are those in Economics.

91 COMPOUND BASIC SUBJECT

Literary Warrant has shown that there could be combinations of two or more (BS). In the Notational Plane, such a combination of (BS) to form a Compound (BS) may be got by compounding, the components being connected by " - " (Hyphen) (10).

Example:

CN1-5	Quantum theory of light
D9UC4-2	Irrigation in desert region
LB-9C	Ayurvedic child medicine
LB-9UA3-9C	Ayurvedic tropical child medicine
X9V-442	Economic depression during war
XM2-7	Public finance in socialistic economy

92 SUMMARY

The table given below gives summarised data on Main Subjects, etc in CC, Ed 6 and Ed 7.

SN	Kind of new (BS) etc	Number in						N common to Natural sc & Social sc	Total of new (BS) etc
		Natural sciences			Social science				
		Ed 6	New	Ed 7	Ed 6	New	Ed 7		
1	Main Subjects	13	32	45	8	8	16	15	55
	11 Main Subjects (Other than Fused and Distilled ones)	13	17	30	8	1	9	-	18
	12 Fused Main Subjects	-	15	15	-	6	6	-	21
	13 Distilled Main Subjects	-	-	-	-	1	1	15	16
2	Partial Comprehension	3	11	14	1	5	6	-	16
3	Subject Bundle	-	12	12	-	-	-	-	12
4	Non-Main Basic Subjects	185	168	297*	-	67	67	-	235
	Total	201	223	368	9	80	89	15	318

*Note.- The total number of Non-Main Basic Subjects in Ed 7 will be = Total of Non-Main (BS) of Ed 6 (185) + the new Non-Main (BS) added (168) — the number of Non-Main (BS) of Ed 6(56) now deemed as Compound Subjects.

921 Annotation

1 The data about CC, Ed 7 given in the table are provisional. The work on Ed 7 is in progress and expected to be completed before the end of this year. It may, however, be said that there may bot be considerable difference in respect of the data on (BS) etc in the final version. Perhaps there may be a few more additions of them.

2 Most of the Fused Main Subjects, Distilled Main Subjects, Partial Comprehensions, and Subject Bundles are new additions in Ed 7.

3 Both in the Natural sciences and in the Social sciences, the Non-Main (BS) constitute about 80 per cent of all the different kinds of new (BS) etc added to Ed 6.

4 Out of the 168 new Non-Main (BS) in the Natural sciences, 90 have been formed by Fission of the Main Subjects newly added to Ed 6.

5 Out of the 67 new Non-Main (BS) in the Social sciences, 50 have been formed by Fission of the Main Subjects existing in Ed 6; and 17 have been formed by Fission of the new Main Subjects newly added to Ed 6.

6 In the Natural Sciences, the percentage of Non-Main (BS) etc has dropped from 92 percent in Ed 6 to about 75 percent in Ed 7. On the other hand, in the Social sciences, there were no Non-Main (BS) in Ed 6, while they constitute about 74 percent of the total of all the (BS) etc in Ed 7.

7 The increase in the total number of all kinds of (BS) etc from Ed 6 to Ed 7 is about two times in the Natural sciences, whereas it is ten times in the Social sciences.

93 ACCOMMODATION OF THE DEVELOPMENTS

In addition to the developments in the Natural Sciences and in the Social Sciences described in the preceding sections, considerable growth has been sensed in the Humanities also. In terms of addition of new (BS), it was most extensive in "M Useful Arts". In the process of revision of the Scheme for Classification, the picking out of the new (BS), the Compound Subjects going with each of the (BS) (both old and new) has involved considerable intellectual as well as routine work. Some of the ideas in the field of Social Sciences pose additional problems in determining the Fundamental Category to which each of them may belong. This is discussed in Paper BA of this Seminar.

94 NOTATION

The interpolation of the new (BS) etc has been made convenient in the Notational Plane by the use of Empty, Emptying, and Empty-Emptying Digits (13). The Empty Digits are z, 0, 9, and Z. The Emptying Digits are T, V, and X. The Empty-Emptying Digits are U, W, and Y.

95 ACKNOWLEDGEMENT

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SPECIAL COMPONENT OF COMPOUND ISOLATE WITH SPECIAL REFERENCE TO SOCIAL SCIENCES: CASE STUDY.

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Case studies of subjects in Social Sciences, illustrating some problems in the formation of Compound Space Isolates and Compound Language Isolates forming facets of Compound Subjects and when such a compound idea is used as a speciator in subjects going with a Basic Subject, are presented. The violation of a principle of Helpful Sequence, homonym in Class Number, and unhelpful allocation of sectors to special components for compound isolates are illustrated. Similar problems arise in subjects other than Social Sciences. The primary reason for the problems is traced to the non-implementation in the Notational Plane of the findings in the Idea Plane regarding the bond strength between the special component and the isolate to which it is attached in a Compound Isolate. A solution is suggested to resolve the problem.

Abbreviations used:

CC = Colon Classification (CN) = Class Number

0 SCOPE OF THE PAPER

The concept of Special Component for forming Compound Isolates has been developed recently.

Provisional schedules of Special Components for forming Compound Space Isolate, and for forming Compound Language Isolates have been drawn up (1). This paper presents a few case studies illustrating some problems in the formation of Compound Space Isolates and Compound Language Isolates forming facets of compound subjects, and when such a compound idea occurs as a speciator in subjects going with a Basic Subject. The case studies are only illustrative. They are based on a study of 350 books and articles in the fields of Social Sciences and Anthropological Linguistics. While the illustrative examples given are mainly from the Social Sciences, some of the problems discussed can also occur in compound subjects in the Natural Sciences.

1 CASE STUDY 1 : EDUCATION

11 Subjects for Consideration

Consider the subjects mentioned in col (b) of the following table:

SN	Subject	Colon (CN)
(a)	(b)	(c)
1	Education in French North-Africa	T.6-9N-A53
2	Education in the French territories in Africa	T.6-A53

The Colon (CN) constructed by using the schedule of Special Component Isolates for Compound Space Isolates (1) is given in col (c) of the table.

12 Sequence of Subjects

In general, it will be more helpful if the documents on the subject "Education in the French territories in Africa" are placed earlier to the documents on the subject "Education in French North-Africa". It would conform to the principle of General to Specific, one of the principles for Helpful Sequence. However, arranged according to the ordinal value of the two (CN), the resulting sequence of the subjects is just the reverse of this.

23 Alternate Number

Consider the (CN): T.6-A53-9N to represent the subject "Education in French North Africa". Then the sequence between the two subjects according to the ordinal value of the (CN) will conform to the principle of General to Specific. However, the (CN) T.6-A53-9N would represent more appropriately the subject "Education in the northern parts of the French territories in Africa". Therefore, it cannot be used to represent the subject 1 in the Table. It will be obvious that such a problem of sequence of Compound Space Isolates involving Special Components can arise in any Compound Subject of the type illustrated here.

2 CASE STUDY 2 : HISTORY

21 Subjects for Consideration

Consider the subjects mentioned in col (b) of the following table:

SN	Subject	Colon (CN)
(a)	(b)	(c)
1	History of British West Africa	V,6-9J-A56
2	History of British African territories	V,6-A56

As in case study 1, the Colon (CN) constructed using the schedule of Special Component Isolates for Compound Space Isolates is given in col (c) of the above table.

22 Sequence of Subjects

In general, it will be more helpful if the documents on the subject "History of British African Territories" are placed earlier to the documents on the subject "History of British West Africa". It would conform to the Principle of General to Specific. However, arranged according to the ordinal value of the two (CN), the sequence of the subjects is just the reverse of this.

23 Alternate Number

Consider the (CN): V,6-A56-9J to represent the subject "History of British West Africa". Then the sequence between the two subjects according to the ordinal value of the (CN) would conform to the Principle of General to Specific. However, the (CN)

V,6-A56-9J would represent more appropriately the subject "History of the Western Parts of the British Territory in Africa". The problem is similar to the one discussed in case study 1. The Compound Space Isolate Idea occurs as a speciator in the Personality Facet here, whereas it was in the Space Facet in case study 1.

3 CASE STUDY 3: SOCIOLOGY

31 Example 1

311 Subjects for Consideration

Consider the subjects mentioned in col (b) of the following table:

SN	Subject	Colon (CN)
(a)	(b)	(c)
1	African people	Y,86
2	African coastland communities	Y,86-h1
3	Commercial class among the African coastland communities	Y,86-h1-45
4	Commercial class of the African community	Y,86-45
5	South African people ..	Y,86-9G

The Colon (CN) for each of the subjects is given in col (c) of the table.

312 Sequence of Subjects

It would be more helpful if the documents on the subject "Commercial Class of the African Community" are placed earlier to the subject "Commercial Class among the African Coastland Communities". The reason is that "Commercial Class among Coastland Communities of Africa" represented in SN 3 covers a smaller and more specific segment of the population of Africa, than "Commercial Class of Africa" represented in SN 4. But, arranged according to the ordinal value of the respective (CN), the sequence of the two subjects is just the reverse. The principle of General to Specific, one of the principles of Helpful Sequence, is again violated.

32 Example 2

321 Subjects for Consideration

Consider the pairs of subjects mentioned in col (b) of the following table:

SN	Subject	Colon (CN)
(a)	(b)	(c)
11	Sociology of the African family	Y,86-2
12	Sociology of the communities of Equatorial Africa	Y,86-2
21	Occupational groups of Africa	Y,86-4
22	Communities of sub-tropical Africa	Y,86-4

The colon (CN) for each of the subjects is given in col (c) of the table.

322 Homonym

It will be seen that a homonym occurs between the pairs of subjects. This is due to the number for the special component for a Compound Space Isolate and that for a Special Isolate in the (I) schedules for Sociology being the same.

4 CASE STUDY 4 : GENERALIA

41 Subjects for consideration

Consider the subjects mentioned in col (b) of the following table:

SN	Subject	Colon (CN)
(a)	(b)	(c)
1	Bibliography on Pacific countries of Asia	z4-97"a
2	Bibliography on South-East Asia	z4-9G"a
3	Bibliography on British West Africa	z6-9J-A56"a
4	Bibliography on African territories of Great Britain	z6-A56"a
5	Bibliography on Pacific Ocean	z97"a

The Colon (CN) for each of the subjects is given in col (c) of the table.

42 Sequence of Subjects

The problem of reversal of helpful sequence of subjects mentioned at SN 3 and 4 is similar to that discussed in case studies 1 and 2 in Sec 1 and 2 respectively.

43 Compound Basic Subject

Each of the (CN) at SN 1 to 4 in the above table appear to denote a Compound (BS) (1). In CC, z Generalia is deemed as a Subject-Bundle. It has been prescribed that the "Sectors in the Array of Order 2 with z Generalia as immediate universe can be utilised as follows (2):

1 Sector (S-1) for a document treating of several subjects on an area. Example:

z4	Orientalia	z5	Occidentalia
z41	Sinology	z6	African studies (Africana)
z44	Indology		

2 Sector (S - A) for documents centring round a person and covering several subjects on account of the wide range of impact of the person. Example:

zG Gandhiana

3 Sector (S - (...)) for an encyclopaedia or an encyclopaedic work on an Isolate Idea. Example:

z(E1,18)	Encyclopaedic work on Gold
z(Y,1)	Encyclopaedic work on Child

Each of the above formations may be deemed as a Basic Subject.

However, while the formation of the Compound Basic Subject z4-97 to represent Pacific Countries of Asia may, in a way, be considered as a lamination of the Basic Subject "z4 Orientalia" and "z97 Studies on Pacific Ocean", this cannot be said of the other (CN) "z4-9G", "z6-9J", etc. For, the digit pairs

"9J" and "9G" each represent a Special Component for Compound Space Isolate and not a Non-Main Component of the Basic Subject -- that is, a Canonical, Specials, or System division taken independently of the Host Main Subject -- "z Generalia" in this case. In any case, the formation of Basic Subjects, with "z Generalia" as the Main Basic Subject component, in the usual way by Fission, giving rise to Canonical, Specials, and Systems Basic Subject, has to be examined. In other words, would there be Specials Basic Subjects and Systems Basic Subjects to be represented as z9N and zN for instance, which may conflict with the existing prescriptions for Basic Subjects with z Generalia as the Main Basic Subject component. Also, whether the ideas now represented as canonical component of Compound Basic Subject with "z Generalia" as the Main Basic Subject component may be deemed as Isolate Ideas, is to be examined.

5 CASE STUDY 5: LANGUAGE VARIANT

51 Subjects for Consideration

Consider the subjects mentioned in col (b) of the following table:

SN	Subject	Colon (CN)
(a)	(b)	(c)
1	Development of a dialect of English-Japanese Pidgin	P,111-j42-d
2	Dialects of African languages	P,6-d
3	Languages of South Africa	P,6-9G-f
4	Languages of forest areas of Nigeria	P,651
5	Languages of Niger Delta	P,651-e50N

The (CN) constructed using the scheduleoof Special Components for Compound Language Isolates (1) and of schedule of Special Components for Compound Space Isolates, are given in col (c).

52 Potential Homonym

In examples 1 and 2, the last component "d" representing "Dialect" is taken from the provisional schedule of Special Components for forming Compound Language Isolates (1). In examples 3 and 5, the last components "f" representing "Forest" and "e5" representing "Delta" are taken from the Schedule of Special Components for forming compound Space Isolates. It may be noted that Zone (Z-a) has been assigned for the schedule of Special Component for forming Compound Space Isolates and also to the Special Components for forming Compound Language Isolates. As may be seen from the above examples, the use of Geographical Device for sharpening a Special Component for Compound Language Isolate can give rise to a homonym in (CN). This is because in a Compound Language Isolate, the digit representing a special component may be either from the schedule of special components for Compound Space Isolates or that for special components for Compound Language Isolates and both the schedules having been assigned one and the same sector. For example, if in the expanded schedule of Special Components for Compound Language Isolates, the digit "f" represents a "creole" variant of a language, then we may have

African Creole = P,6-f = Languages of the Forest
Region of Africa

6 SUMMARY OF PROBLEMS

The problems in the formation of Compound Space Isolates with Special Components and using them as speciators (qualifier) in a facet in compound subjects may be summarised as follows:

1 The violation of the Principle of General to Specific, one of the Principles for Helpful Sequence, in the arrangement of Compound Subjects;

2 Homonym in (CN) due to

21 One and the same digit or digit-group being used to denote different ideas in two different schedules — Special Components for Space Isolates and Special Components for Language Isolate, and

22 The prescription to use the digit or digit-group from both the schedules for the formation of a Compound Language Isolate;

3 The occurrence of a Compound Idea with a Special Component as a speciator (qualifier) in another Compound Isolate in a subject;

4 Practically all the sectors having been assigned to the Special Components for Compound Space Isolate, leaving practically no useful sector for the other speciators occurring in a facet of a subject; and

5 The (CN) formed with Special Component for Compound Space Isolate with 'z Generalia' as Host Main Subject appearing as if it were representing

Compound Basic Subject although in the idea plane, the formation is not deemed as a Compound Basic Subject.

In the succeeding sections, solutions to some of these problems are discussed.

7 NOTATIONAL PLANE

71 Sequence of Speciators

When a compound idea with a special component occurs as one of the speciators in a facet of a subject, its position is, as usual, fixed among the speciators concerned by applying the Wall-Picture Principle. In the notational plane, the sequence is retained by using the Principle of Inversion as applied to speciators.

In the set of speciators, some may be enumerated in the schedule whereas others may be prescribed to be derived using one or the other of the devices. For example, the speciators on the basis of the characteristic "By Make" or "By Design" are usually prescribed to be derived by Geographical Device (GD). It will be remembered that practically all the sectors have been allocated for the Special Components for Compound Space Isolates. Thus, in using the Geographical Device for the speciators derived on the basis of the characteristic "By Make", all the sectors will be used up, leaving practically no useful sectors for the other speciators. One possible solution is to use the sectors from Zone (Z - (...)) in the first, second, or later order array according to convenience, for the number for speciator to be derived by (GD).

Example.-

M7	Textile Manufacture
	(1F1) Isolates
3	Cloth
5	Carpet
Z( )	By Design By (GD) (Illustrative)
Z(44)	Indian design
Z(44-g70V-9B)	Design from the Eastern regions of the Vindhyas
Z(4436)	Gujarat design
Z(4436-9G)	South Gujarat design
Z(4436-9Q)	Central Gujarat design

This would leave other sectors free for assignment for the other quasi-isolates.

72 Notation for Special Component

In the example given in Sec 51, it was indicated that a conflict arises between the numbers used in the schedule of Special Components for Compound Space Isolates and those in the schedule of Special Components for Compound Language Isolates, as both the schedules are used in the formation of Compound Language Isolates. The sector (S - a) has been prescribed for Special Components except for the Special Components for Compound Space Isolates. For the latter, all the sectors of Zone (Z- a), that is, (S - a) onwards, have been used. Hence the conflict leading to homonym in (CN) mentioned in Sec 51. To avoid this, it is necessary not to use (S- a) for Special Components for Compound Space Isolates. Thus the Physical Features should preferably be allocated the sector (S - za) . This could also be done as a special rule when these isolates are used as Special Components in the formation of Compound Language Isolate. Then the homonym mentioned in Sec 32 will get resolved as follows:

P,6-f	African Creole
P,6-zf	Languages of forest regions of Africa

73 Sequence of Special Components

A Compound Space Isolate may consist of two or more Special Components.

Example : 9-9J-A56 British West Africa

In Sec 21, it has been pointed out that the preferred sequence between the subjects
"History of British African Territory" and
"History of British West African Territory"
is reversed in the notational plane and hence unhelpful. As a partial solution, the following suggestion is made:

If in a given context, to represent an idea, a Special Component for Compound Space Isolate is to be combined in a sequence just the reverse of that suggested in the schedule of Special Components for Compound Space Isolate, then the first Special Component occurring in the Compound Isolate Number concerned is to be prefixed with the digit "Z". Thus, the subjects of the examples given in Sec 11 and 21 would get the following (CN):

T.6-A53	Education in the French Territory in Africa
T.6-Z9N-A53	Education in French Territory of North Africa
V,6-A56	History of British African Territory
V,6-Z9J-A56	History of British West Africa

The above sequence of subjects conforms to the Principle of General to Specific.

This technique is helpful even when the Compound Space Isolate is placed in parenthesis -- that is packeted -- as suggested in Sec 71. Obviously, this provision is to be borne in mind when allocating sectors to the speciators in a packet, particularly those to be derived by (GD).

8 IDEA PLANE

81 Attributes of Special Component

In a Compound Isolate containing a Special Component, the primary isolate and the special component are connected by a hyphen (-). An idea occurring as a speciator forming a compound isolate in a facet is also connected to the isolate idea qualified or speciated, by a hyphen (-). Thus, in the notational plane, the special component is treated in the same manner as a non-special component idea occurring as a speciator. However, a special component has certain special attributes:

1 It can be used as speciator only with certain prescribed isolate ideas. For example, a special component for Compound Space Isolates can be used only for forming Compound Space Isolates;

2 Whenever it is used, it is invariably preceded by one or the other of the prescribed isolate ideas only -- for example, a special component for Compound Space Isolate is invariably immediately preceded by a Space Isolate only; and

3 It does not occur as an isolate by itself.

In contrast, an ordinary speciator can occur by itself in different facets in different subjects. Further, the non-special component idea occurring as a speciator can also occur as an isolate. For example, the speciators derived on the basis of the characteristic "By Size" can be used with many different isolate ideas, such as Molecule, Tree, Table, Elephant, and Human being. Thus, Big Molecule, Small tree, Low table, Large elephant, and Small human being Also, each of the ideas "Size", "Big", "Large", and "Small" can occur as an isolate by itself.

For example:

"Size" of Molecule, "Largeness" of Molecule, "Smallness" of Man, etc.

82 Strength of Bond

As a corollary to what has been discussed in Sec 81, it follows that a special component in a compound idea (whether the latter occurs as an isolate or as a speciator in a subject) should not be separated by any other idea from the isolate idea to which it is prescribed to be attached. Of course, it can be separated by another special component from the same schedule of special components. This is not the case with a non-special component occurring as a speciator. For example, consider the speciator "Large" in the following subjects:

Table - Indian design - Large
Table - Indian design - Dining - Large
Table - Indian design - Dining - Wooden - Large

Compare this with the special component "South" in the following subject:

Table - Indian design
Table - Indian - South - Design - Wooden - Large
Table - India - South - Coast - Design - Dining - Wooden - Large

A speciator such as "Large" or "Dining" or "Wooden" cannot be interposed between "India" and the Special Components "South" and "Coast" prescribed to be attached to it. This implies that the strength of bond between the idea "India" and the special components "South" and "Coast" attached to it is greater than that between the compound idea "South India Coast" and other speciators such as "Dining", "Wooden" and "Large" occurring in the facet. Thus, it follows that a coextensive representation of the idea in the notational plane demands the expressive indication of this greater strength of bond between an idea and its special components as differentiated from the attachment of an ordinary speciator to an isolate.

83 Indicator Digit

The greater strength of bond mentioned in Sec 82 should preferably be represented by an appropriate Indicator Digit.

831 Ordinal Value

In choosing such an indicator digit, it is essential to fix its ordinal value such that the sequence of subjects arrived at in the idea plane is retained in the notational plane.

It is found that the ordinal value of this indicator digit should lie between the indicator digits "hyphen (-)" and "equal to sign (=)" already in use in CC notational system.

832 Other Factors

The other factors for consideration in the choice of the indicator digit are:

1 The ease with which it can be written as a distinct digit;

2 Availability of the digit preferably as a single stroke in the typewriter; and

3 The mnemonic or symbolic value of the digit.

833 Suggestion

The "equal to sign (=)" nearly satisfies these conditions. However, there will be a conflict with the present use of this digit in connecting the abbreviated components of a multinomial resulting from the use of the Alphabetical Device. At the beginning of this section, we had indicated that the "equal to sign (=)" in its present use denotes a strength of bond greater than that between a Special Component and the isolate idea to which it is attached. Therefore, it is provisionally suggested that

1 The Equal to sign (=) be used for connecting the special components in a compound isolate; and

2 The Congruence sign (≡) for connecting the components of the abbreviations of a multinomial where the strength of bond is higher than that between the primary isolate and special component in a compound isolate.

The following examples illustrate the use of the indicator digits:

GV,2	Bacteria
GV,2B	Bacillus sp
GV,2B-Z44	Bacillus sp adapted to Indian environment
GV,2B-Z44=9G	Bacillus sp adapted to South Indian Environment
GV,2B-Z44=9G=h1	Bacillus sp adapted to South Indian coast environment
GV,2B-Z91-Z44	Soil Bacillus adapted to Indian environment
GV,2B-Z91-Z44=9G	Soil Bacillus adapted to South Indian environment
GV,2B-Z91-Z44=9G=h1	Soil Bacillus adapted to South Indian coast environment
GV,2B≡S	Bacillus subtlis
GV,2B≡S-Z44=9G=h1	Bacillus subtilis adapted to South Indian coast environment

It is worth noting that with the use of an appropriate indicator digit for connecting the special component with the primary isolate, the use of packeted notation mentioned in Sec 71 may be avoided.

84 Summary of Suggestions

1 Use of "Equal to sign (=)" for connecting a special component number with the primary Isolate Number;

2 Use of "Congruence sign (≡)" for connecting the components of a multinomial to which the Alphabetical Device is applied; and

3 Use of the sector (S - za), instead of sector (S - a) for the schedule of Physical Features in the schedules of Space Isolates when a number from the former schedule is used in forming a Compound Language Isolate.

Sec 91 gives a list of the examples mentioned in this paper classified using the new indicator digit.

91 Classified Examples

SN	Class Number	Name of Subject
1	z4=97"a	Bibliography on Pacific countries of Asia
2	z4=9G"a	Bibliography on South-east Asia
3	z6=A56"a	Bibliography on British Africa

Special Component of Compound Isolate BD91

SN	Class Number	Name of Subject
4	z6=Z9J=A56"a	Bibliography on British West Africa
5	z97"a	Bibliography on Pacific Ocean
6	GV,2	Bacteria
7	GV,2B	Bacillus sp
8	GV,2B-Z44	Bacillus sp adapted to Indian environment
9	GV,2B-Z44=9G	Bacillus sp adapted to South Indian environment
10	GV,2B-Z44=9G=h1	Bacillus sp adapted to South Indian coast environment
11	GV,2B-Z91-Z44	Soil Bacillus adapted to Indian environment
12	GV,2B-Z91-Z44=9G	Soil Bacillus adapted to South Indian environment
13	GV,2B-Z91-Z44=9G=h1	Soil Bacillus adapted to South Indian coast environment
14	GV,2B≡S	Bacillus subtilis
15	GV,2B≡S-Z44=9G=h1	Bacillus subtilis adapted to South Indian coast environment
16	M7,5-Z44	Carpet of Indian design
17	M7,5-Z44=Zg70V=9B	Carpet designed in the eastern region of Vindhyas
18	M7,5-Z4436	Carpet of Gujarat design
19	M7,5-Z4436=9G	Carpet of South Gujarat design
20	M7,5-Z4436=9Q	Carpet of Central Gujarat design

1981

SN	Class Number	Name of Subject
21	P,111=j42=d	Dialect of Pidgin English
22	P,6=d	Dialects of African languages
23	P,6=f	African creole
24	P,6=zf	African forest languages
25	P,6=9G-zf	Languages of South African forest areas
26	P,651	Languages of Nigeria
27	P,651=ze50N	Languages of Niger Delta
28	T.6=A53	Education in the French territories of Africa
29	T.6=Z9N=A53	Education in French North Africa
30	V,6=A56	History of British African territories
31	V,6=Z9J=A56	History of British West Africa
32	V,86	African people
33	YY,86-2	African family
34	Y,86-4	Occupational Groups of Africa
35	Y,86-45	Commercial class in Africa
36	Y,86=h1	African coastland communities
37	Y,86=2	Communities of equatorial Africa
38	Y,86=4	Communities of sub-tropical Africa
39	Y,86=9G	South African people

SN	Class Number	Name of Subject
40	Y,86=Z41-45	Commercial class of African coastland communities
41	Y,86=Z9J=A56-45	Commercial class of British West Africa

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DOCUMENTATION SERVICE TO TOP MANAGEMENT.

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In selecting the documents for the Top Management of a Business Enterprise, the help of the different Facets in Book Number, and of the Common Anteriorising Isolates and of the Common Energy Isolates are explained. How the documentalist should feed the Top Management, with documents on their core subjects of interest, is described. For doing efficient documentation service -- both on demand and in anticipation -- the documentalist should have close contact with the Top Management. Demonstration of such service to several Top Managements is the only way to secure large scale acceptance by India of the value and necessity of Documentation Service to specialists of all kinds.

1 INTRODUCTION

The term 'Business Enterprise' is taken to denote

1 Any organisation engaged in the Production and/or Marketing of a commodity;

2 Any research institution; or

3 Any Department of a Government or a Government as a whole. For definiteness and without loss of generality, this Paper uses category 1 mentioned

above as a model. The Top Management of a Business Enterprise is taken to consist of a Managing Director as its head, and the necessary number of Directors. Each ordinary Director will be a person with a special knowledge of one or more of the operations of the Business Enterprise -- such as, Design, Production, Marketing, Finance, and Accounts. The Top Management will not always be interested in documents giving a full and detailed exposition of any of the subjects of the interests to the Business Enterprise as a whole. Some of the kinds of documents, to be served to the Top Management are indicated in the succeeding sections. Normally, Documentation Service to the Top Management will be restricted to them.

2 BOOK NUMBERS OF DOCUMENTS AS A GUIDE

One way of selecting the documents of interest to the Top Management is to take the help of the different facets in their Book Numbers. The succeeding Sections show which focus in each facet of the Book Number will be of interest to the Top Management.

21 Language Facet

The Top Management should be served only with either

1 A document in the language of the library; or

2 A translation into the language of the library of a document in any foreign language -- either in whole, or as abstract, or of selected portions, depending upon the nature of the document. For this

purpose the Documentation Division should include a qualified translator, if the quantity of translation to be done would demand it.

22 Form Facet

The following are the Forms of exposition of the documents of interest to the Top Management:

c List. Documents in the form of a list, alphabetical or classified. The trade lists of different Business Enterprises of the same kind as itself and of their auxiliaries are examples of this kind;

d Data Book. Data document of every kind, giving patterns and recipes;

f Picture. Pictorial presentation etc;

g Plan. Section, Elevation, Relief, and Diagram;

h Graph. Graphical form, such as Curve, Histogram, Representation in Perspective, etc;

n Opinion. Expressed by competent persons on the commodities etc, forming the field of the Business Enterprise;

q Code. Forms such as, Patent, Standard, Specification, and Law; and

x4 Press-cuttings, and cuttings from other documents.

23 Year Number Facet

The Top Management will normally be interested only in documents published in the current year or in a few preceding years. However, any document published in an earlier year, containing information currently valid, should be brought to the notice of the Top Management.

24 Criticism Facet

A document containing any evaluation of any of the policies, processes etc, falling within the purview of the Business Enterprise will be of interest to the Top Management. It will be of interest even if the evaluation is related to any sister Business Enterprise. A general evaluation, not relating to any particular Business Enterprise, but of value to the Top Management should also be served.

3 COMMON ANTERIORISING ISOLATES AS A GUIDE

One way of selecting documents of interest to the Top Management, is to take the help of the different Common Anteriorising Isolates in the Class Numbers. The successive sections show which Common Anteriorising Isolates in a Class Number will be of interest to the Top Management.

d Table. A document giving the relevant and needed information in a tabular form which facilitates getting a rapid overall view and the picking of information of interest to the Top Management. Budget, Balance Sheet, and Statistical Data are examples.

e Formula. Any formula that puts the factors of interest to the Business Enterprise, in the form of succinct formula, will be of great help to the Top Management. The formula may occur in some books or articles or books of formulae.

f Map. A specially marked map will be of help to the Top Management, in respect of certain matters. Such a map should indicate the localities and areas of interest to the Top Management. Under each locality or area indicated, quantitative information or a brief account in words, should be added. Unless it already exists in a published form, such a map should be specially prepared by the documentalist, giving the information of interest to the Top Management. For example, a map may indicate information such as the following:

1 The location of the branches of the Business Enterprise;

2 Other Business Enterprises of the same kind; and

3 Areas where marketing by the Business Enterprise is in progress and potential areas for marketing. In each such case, the data to be indicated will have to be determined according to context.

k Cyclopaedia. These may give general information in brief or suggest speaking points to be used in any public relation work. Tags should be put in at relevant pages.

m Periodical. Current issues or volumes of periodicals. Tags should be inserted at the pages where information of value to the Top Management. The tags may mention either the abstract or part of any paragraph to be taken note of. If the article does not contain an abstract, an abstract prepared by the documentalist should be attached to the tag.

n Serial. The current volume of any periodically published reference book. Tags should be inserted at the pages where up-to-date information or data are given either as revisions or as supplements.

p Proceedings of Conference. Having a bearing on the subject of the Business Enterprise with tags inserted at the places where information of value to the Top Management. Wherever necessary, a short abstract of the relevant information, prepared by the documentalist, should be attached to the tag.

r Administration report. The administration reports of the Government of the home-country (and State), and of other countries with which the Business Enterprise has contact, and of the other Business Enterprises of the same kind. Tags should be inserted at the places where information of value to the Top Management is located. If comparative study with any earlier administration report is warranted, a copy of it should also accompany the report of the current year. The tag in such a report should invite attention to whatever is important and relevant.

s Periodical statistics. The current issue of periodical statistics bearing on the Business Enterprise. Tags should be inserted at the places where information of value to the Top Management occurs. Similar statistical periodicals, issued by other countries and Business Enterprises with some information of interest, should also be served. Apart from documents containing Annual Statistics, any relevant stray statistics should also be served.

t Reports of Commissions and Committees. Reports currently issued by any Commission or Committee (ad hoc or permanent) with a bearing on the interests of the Top Management. Tags should be inserted at the places where information of value to the Top Management occurs.

v History. Any currently published, or otherwise relevant History of the Business Enterprise, in relation to home-country or any other country, with tags inserted at the places where information of value to the Top Management occurs.

w Biography. Any currently published or otherwise relevant Biography of outstanding persons in the field of the Business Enterprise, whatever be their country, with tags inserted at the places where information is of value to the Top Management.

y2 Synopsis. Any synopsis likely to be of interest to the Top Management.

y7 Case study. Case studies, describing the work of any Business Enterprise of the same kind as itself, if necessary, a tag should be inserted.

y8 Digest. Any published digest bearing on the Business Enterprise and of any legal document of the same nature.

Note.- Each tag should contain the number of the page where it is inserted. If necessary, it should also give the part or parts of pages to which the attention of the Top Management is invited.

4 SUBJECTS OF INTEREST TO TOP MANAGEMENT

40 Two Major Areas

In Sec 2 and 3, we considered the external form of embodiment, and internal form of presentation of any information of interest to the Top Management. These belong to the peripheral features. We shall next examine the core subjects of interest to the Top Management. In the set-up of a Business Enterprise, the Top Management occupies, as it were, the junction of the present and the future. The present is concerned with the efficient running of the Business. The future is concerned with the preparation for the future development of the Business. The first area may be denoted by the term 'Administration', and the second area may be denoted by the term 'Planning for the Future'. The following subjects will figure in both the areas:-

1 Layout of the work;
2 Design and production;
3 Channels in the flow of work;
4 Files;
5 Public relation, including
  51 Market study and creation, and
  52 Purchase of materials and sale of products;
6 Relation with Government;
7 Personnel affairs, including
  71 Wages,
  72 Safety measure,
  73 Social security,
  74 Employee service, and
  75 Industrial relation; and
8 Finance and accounts.

41 Administration

In respect of the area of Administration, the Top Management will get the necessary information from the officers concerned. The only way in which the documentalist will get into this picture will be in furnishing on demand any documents showing the methods for improving the routine of work without violent changes and without involving change in policy.

42 Planning for the Future

In respect of the area of Planning for the Future, policy will figure largely. To determine the lines of improvements in policy, the Top Management will require documents concerning

1 New theories on the various subjects, mentioned in Sec 40;

2 Accounts of practices and developments in similar Business Enterprises at home and abroad; and

3 Changes in Government policy, impending or in contemplation.

It is in these subjects that the documentalists should be on the look-out for documents, whatever be their forms of embodiment or modes of exposition. It is the duty of the documentalist to be continuously searching for such documents and bringing them to the notice of the Top Management, either in the form of Periodical or Ad hoc Documentation List, according to the context and urgency. It is here, which is the distinctive and vital area of interest to the Top Management, that the documentalist has a great responsibility. He should act as the tentacles, as it were, of the Business Enterprise.

5 CONTACT WITH TOP MANAGEMENT

The documentalist should have periodical contacts with the Top Management to know what subjects are engaging their attention. He should also inform himself of the agenda of every meeting of the Top Management. On the basis of it he should ascertain from the members of the Top Management -- particularly from the Managing Director -- whether the list of items on which he is collecting information is sufficient or information should be collected on any other items also. He should also do similarly with the Managers of the different Sections of the Business Enterprise, taking care to see that nohing confidential is disclosed to any of them. For, as a documentalist, even confidential matters, on which documentation service is required, will be disclosed to him by the Managing Director.

6 DOCUMENTATION SERVICE ON DEMAND

All that has been said in Sec 42 and 5 amounts to Documentation Service in Anticipation. What is described in Sec 5 is a process of creating demand for Documentation. Therefore, it may be described partly as Documentation in Anticipation and partly as Documentation on Demand. The documentalist should also do systematic Documentation Service on Demand. In this kind of Documentation Service,

1 Either, the relevant documents will have to be sent upto the Top Management;

2 Or, a digest of the information required may have to be prepared and sent.

7 DEMONSTRATION POTENTIAL

Apart from being an important and necessary responsibility of the Documentalist of a Business Enterprise, Documentation Service to the Top Management has immense demonstration value. Indeed, its demonstration potential is enormous. A Neelameghan has given an illustration of this in Sec 6 of his paper entitled "Top Management's Use of and Reaction to Library Service" and presented to the International Congress of Documentation (1970)(Buenos Aires). I know the value of this demonstration because I have an earlier knowledge of apathy -- nay, even antipathy -- in some of the Government circles. I know also of the failure of the Documentation Section of a Ministry, because of its inability to convince its Top Management with adequate service, either in-anticipation, or on-demand. If the Top Management of a Business Enterprise is known to attach a considerable value to Documentation Service all the other persons in the Business Enterprise will accept Documentation Service and also respect the Documentalist -- nay,even treat him to be an important partner in their work. Documentation Service is not making sufficient impact on the authorities of the Business Enterprises, Research Institutions, and the Government. A mere verbal or written appeal will not produce the necessary effect. It is only demonstration by service to several Top Managements that will carry conviction about the essential value and necessity of Documentation. A few Documentalists in India, raised directly or indirectly by DRTC, have already done this demonstration remarkably well. The number of these demonstrations has not yet proved sufficient. But the other documentalists, indluding the Alumni of DRTC, have not succeeded in this. In a vast country such as India, that is just now developing after a long long spell of restphase and inaction, many more such demonstrations are necessary. The appeal goes that the Alumni of the DRTC should carry with them the fervour of pioneers and do such a demonstration, whatever be the obstacles in their way, remembering that only a bad Dancer attributes his failure to the wrong shape of the Dancing Ground. It is only through their personality and persistence that they can succeed in the demonstration. And, it is only their success in the demonstration that will make India accept Documentation Service on a wide scale.

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MANAGEMENT INFORMATION SYSTEM : AN OVERVIEW.

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Intellect is the most dynamic ingredient among the inputs into the conversion process of an industry. Information is the fuel that energises the intellect of a business represented by management. Information flows continuously through the arteries of a business and all the 'white-collar' workers are engaged in shuffling information contributing to 30 to 40 per cent of the cost of running a business. In addition, there is a downpour of external information affecting the business. It is almost impossible for any executive to keep track of all the relevant information however narrow his subject field may be. Therefore, it is essential to create an institutionalised facility for harnessing such information and feeding it to the various decision-making points in a Company. A model for such a facility can be visualised by treating the company as a problem inventory to solve problems with a data base which provides information and knowledge to solve each problem. A Business Information Centre is the best agency to provide such a service in conformity with the dynamics of a business. The person operating such a centre -- that is, the documentalist -- can bring a multidisciplinary approach to meet the challenge of organising an effective Management Information System.

1 DECISION-MAKING PROCESS AND INTELLECT

11 Function of Management

Management is essentially concerned with planning,

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co-ordination, execution and control. An essential and dynamic attribute of the management activity is decision-making. An activity resulting from a decision leads to a value being added to a commodity. The value added is a direct outcome of a conversion process. The conversion consists of the interplay of the factors of conversion. The factors of conversion and the conversion process in an industry can be viewed as an input/output model (See Fig 1 in Sec 91).

12 Role of Intellect

Plant, machinery, and buildings being tangible assets are shown in the asset side of the Balance Sheet. Intellect, on the other hand, is an intangible asset and is covered up partly in salaries and wages and partly in administrative expenses normally termed as overhead. Intellect is the living dynamic ingredient. The other ingredients are inanimate. They get energised because of intellect. Intellect is the force which provides torque for the business motor; the torque is proportional to the force. The fuel which must be burnt to generate this force (Intellect) is Information.

13 Information

Like a fuel, information must have a low residue and a very high caloric value. Most of the time, the fuel of desired quality is not available and hence sub-quality fuels have to be beneficiated to get the required quality of fuel. Beneficiation adds to the cost. The cost, therefore, must be justified through gains greater than the cost incurred.

The effectiveness of a machine decreases over time till a stage is reached when increase in maintenance cost does not yield positive increase in the production from the machine. On the other hand, the effectiveness of the intellect can increase over time by providing continuously up-to-date information to the executives who represent the intellect of the interprise. Therefore, the function of organising for acquisition, storage, analysis, and dissemination of information to various decision-making points is of vital importance to a company. Management Information System (= MIS) is a generic name for the totality of such functions in any enterprise. The MIS assumes critical importance, particularly in an environment of intense competition, breath-taking technological progress, and ever-changing customer behaviour.

2 INFORMATION SYSTEM MODEL

Therefore, any business or manufacturing institution should have an integral organisational structure with built-in facility for smooth flow of information. In turn, this would aid decisions conducive to discharging the planning, executive, and control functions in the institution. Fig 2 (See Sec 91) is a schematic diagram of a basic model of an information system. It reveals the flow of information in an organisation centering round the decision-making process and the resultant action, co-ordination and control devices in order to achieve the objectives of the enterprise.

Fig 3 (See Sec 91) illustrates the nature and functions of an information system in the context of a dynamic business situation.

3 INFORMATION, DATA, AND KNOWLEDGE

It would be helpful at this stage to clarify my concept of information vis-a-vis data and knowledge.

31 Data

Data is any uninterpreted raw statement of fact or an unevaluated message.

32 Information

Information is data recorded, classified, organised, related or interpreted within the context of a specific problem-situation to convey meaning.

33 Knowledge

Knowledge is data evaluated or interpreted in a general context for future use.

Therefore, information required for decision-making is evaluated data for particular problem, for a specified individual or a team, at a specified time, and for the explicit purpose of achieving a definite goal.

4 INTERNAL INFORMATION

In the sense in which I have defined information, it is easy to realise that in any organisation the majority of the white-collar workers -- ranging from the clerical force to the chief executive -- are engaged in handling and shuffling information. It is said that 90 per cent of the efforts of the white-collar force concerns seeking and preparing information. Even in a typical Engineering Department, 80 per cent of the efforts of engineers relate to information.

41 Cost of Internal Information

In a manufacturing organisation, over 30 per cent of its cost is found to be the cost of information -- often conveniently hidden under "Administrative Expenses". With increased automation and sophistication in industry, the proportion of white-collar workers is on the increase. For example, between 1910 and 1950, in USA, there was an increase by 292 per cent in the white-collar workers -- whereas the entire labour force increased only by 60 per cent during the same period.

Much of the information work manifests itself in the form of paper work; and paper work, in turn, is increasing at an enormous rate. For example, in the Ford Motor Company, USA, it has been estimated that they use a ton of paper for every ton of automobile produced. It is, therefore, clear that here is an area for enormous cost reduction, apart from making it effective for decision-making. Therefore, we should think in terms of information economics.

5 EXTERNAL INFORMATION

51 Volume

In addition to the volume of internal information generated at a high premium, we are now faced with the external information which has an impact upon our organisation. There is such a plethora of growth of external information that the phenomenon has been described rightly as "Information Explosion". It is estimated that every year about 200,000 patents are being issued and about 10 million technical catalogues and product literature are being published. About 1,000,000 technical periodicals with well over 2 million technical articles between their covers are being produced every year.

52 Problem of Keeping Up-to-date

In such a situation, it is well-nigh impossible for an executive to know even the existence of information relevant to his work, however specialised it may be. Apart from the time factor, the cost factor also is extremely high. But no executive can afford to dispense with the relevant data and knowledge. Particularly, the present competitive environment places a higher stake in the risk value of ignoring the information gap.

Efficiency in information handling assumes enormous importance when computers are used to process information. In two seconds, a computer can commit errors equivalent to errors committed by 50 men working for 20 years and only making errors. As a basis for organising an information system, we should evaluate knowledge or information in terms of quantity, quality, reliability, and time.

6 INFORMATION-GAP

It should, however, be admitted that, for management, there will seldom, if ever, be a situation where all the relevant information needed for an ideal solution of a problem will be available in time. Nevertheless, the cost of a poor decision resulting from a knowledge-gap is too high to be accepted without a challenge in a fast changing business environment. Therefore, efforts should be directed to obtain optimum information within the time available to make a decision.

61 Decision Situation

Fig 4 (See Sec 91) shows a typical decision-situation. The top curve indicates the statement or definition of a problem and the bottom one indicates the extent of information available in any given situation.

The levelling out of each curve represents the recognition of diminishing returns for additional inputs. The gap between the levelling off points for both the problem definition and information availability curve represents the typical situation where we could consider making a decision without further information. This is called the decision-gap. Only in this situation, the use of human judgment is justifiable.

7 MANAGEMENT OF INFORMATION SYSTEM

71 Three Areas for Consideration

The management of information needs our full attention. The problem of organising an efficient information system in an enterprise, therefore, can be boiled down to the following three areas:

1 Determination of the information calls for our full enterprise, irrespective of the media carrying the messages;

2 Designing the format of reports, forms, cards, tapes, etc to suit the specific information needs; and

3 Designing a system for proper management and servicing of information.

72 Profile of Information

There are three types of information required by a business organisation, for its decision-making activity. These are:

1 External Information for planning and policy decisions.- This includes information relating to national and international economics, trade and commerce, technology, research and development, government policies relating to new licences, changing industrial, labour and management patterns, trend of new products abroad, export data, and so on.

2 Competitive Information for strategic and

tactical decisions.- This includes information relating to new licences, new products, market intelligence, financial policies, expansion programmes, collaborations and mergers concerning the competitors.

3 Internal Information for control-decisions.- This includes information relating to business operations such as progress reports, exception reports, and correction measures in the financial, production, marketing, research and development, and personnel management areas.

73 Organisation of Management Information System : A Model

731 Data Base and Cycle of Activities

The best method of ensuring the availability of such information in a company is to institutionalise the supply of the information to executives in the company.

I would like to visualise such an institutionalisation in a company environment as shown in Fig 5. (See Sec 91). Each company has its own corporate goals. From these goals are derived the functional goals for Marketing, Finance, Manufacturing, Development, and Personnel. Each such function generates its own respective problems. The problems of all functional areas form the problem inventory for the company. The achievement of the goals depends upon solving these problems in the best possible manner. Solution of these problems need information or knowledge. Therefore, in the company we create a Data Base. The data base should be designed to ensure immediate availability of data relevant to any specific problem-situation. Then the data is processed in relation to the specific problem-situation to generate several alternative solutions. Of these alternatives, a decision is taken to choose the best alternative. This decision, in turn, generates new problems and new data. And the new data is fed back into the data base. Continuous processing of information will generate new knowledge, which may be unique to a particular company and may, therefore, contribute to the knowledge base or expertise of the company. Whereas the function of acquisition, storage and finding of data can best be done by the techniques developed by library science, processing of information by matching it with specific problem-situations can be done by a team of specialists composed of Documentalist, System Analyst, Operations Research Scientist, O & M Specialist, and so on. Organising such an institutional facility in each company contributes a good deal to the maintenance of its competitive strength, and management and technological leadership.

732 Business Information Centre

The data base with facilities for converting the data into information and knowledge in relation to the problems of the company can be best organised by a Business Information Centre. Fig 6 (See Sec 91) gives an outline of the organisation and function of such a Centre, which we are attempting to develop in our own company. It is needless for me to elaborate the details to a DRTC audience, which is quite familiar with them. However, I would like to emphasise that such an information centre should bring under its active control the entire gamut of internal data found in the files, minutes, reports and data sheets of the company and make them available to the decision makers, properly processed and matched with the external information available in the Centre. Of course, this will be over and above the information received by the decision makers through the normal line and staff channels, which may lack the total information approach which the Business Information System can provide.

74 Dynamics of Total Business System

The dynamics of a total organised information system in a business establishment encompassing its functions, ranging from the abstract to concrete specification, is schematically shown in Fig 7 (See Sec 91). The top quadrants picture the abstract part of the business, while the bottom half represents the concreteness. The quadrants to the left indicate actions contributing to the input into the management information system, which forms the corporate memory, while the right quadrant represents the output from the information system. Such a conception would help a business manager to recognise the areas required for evaluation of the essence of information relative to the health of his enterprise.

8 ROLE OF INFORMATION SCIENTIST

My attempt in this paper is essentially to emphasise the importance of a Management Information

System; to furnish an overview of its nature and scope, and indicate the problems and prospects of organising an institutional facility to ensure an effective Management Information System in a company. My intention is to draw the attention of documentalists and information scientists to this new and challenging area which they are best suited to tackle.

In recent years, information has become the main stock-in-trade and the most dynamic resource of management. Harnessing this resource is attracting greater attention from management than any other resource. In fact, the instant success and popularity of computers is because of its unique contribution in handling and processing information. A plethora of documents has been rolled out by the computer-people on Management Information System. But, in my view, the crux of the problem is not so much the processing of data as in organising the data. Therefore, I consider that the Information Scientists of the type trained by DRTC are more competant to tackle this problem in its true perspective. But the information scientist should, to face this challenge, undergo a great deal of change in attitude, and evolve even more sophisticated methods and techniques based on an inter-disciplinary approach which may include the Operations Research, Systems Analysis, Computer Science, and Cybernetics, in addition to Library Science. In decades to come, I can visualise such a brand of information scientists to become the most influential professionals, whose impact will be felt for the better not only on management but on every other branch of knowledge.

91 DIAGRAM

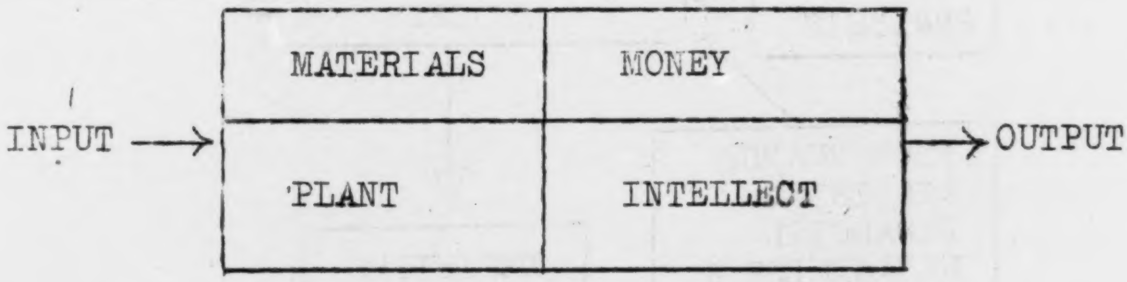

Fig 1. Dynamic Balancing Model of a Business

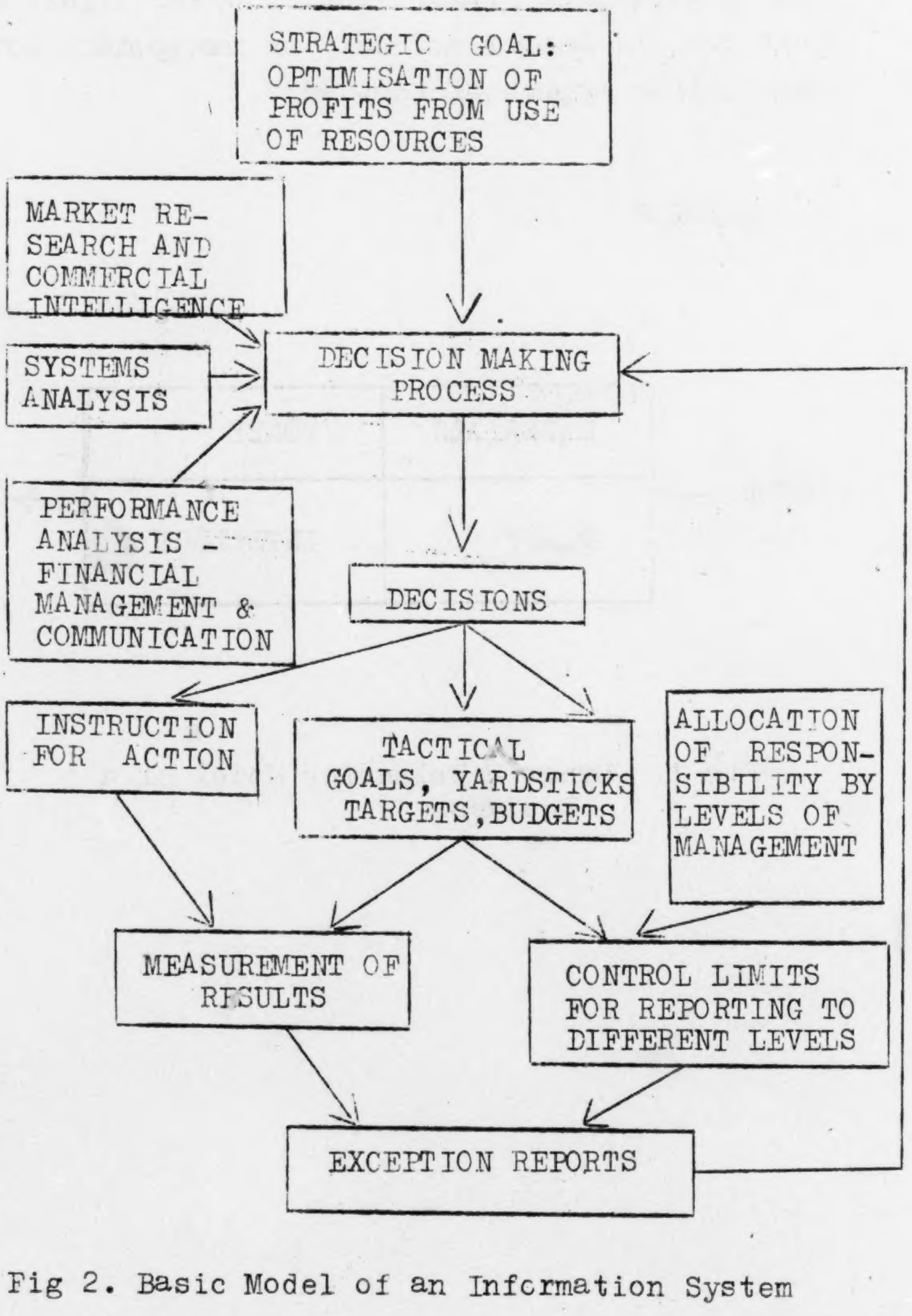
STRATEGIC GOAL: OPTIMISATION OF PROFITS FROM USE OF RESOURCES
MARKET RESEARCH AND COMMERCIAL INTELLIGENCE
SYSTEMS ANALYSIS
PERFORMANCE ANALYSIS - FINANCIAL MANAGEMENT & COMMUNICATION
DECISION MAKING PROCESS
DECISIONS
INSTRUCTION FOR ACTION
TACTICAL GOALS, YARDSTICKS TARGETS, BUDGETS
ALLOCATION OF RESPONSIBILITY BY LEVELS OF MANAGEMENT
MEASUREMENT OF RESULTS
CONTROL LIMITS FOR REPORTING TO DIFFERENT LEVELS
EXCEPTION REPORTS

Fig 2. Basic Model of an Information System

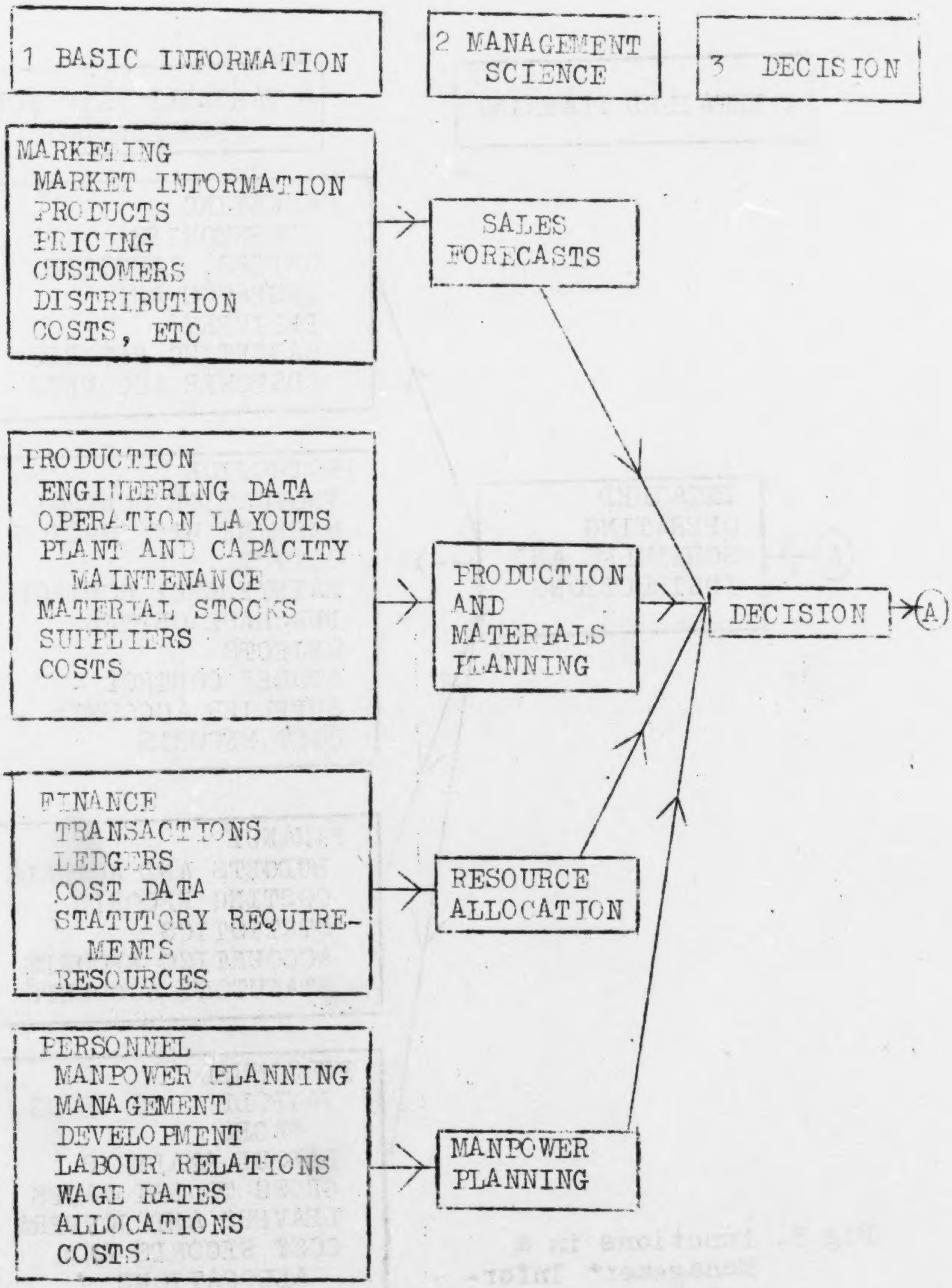

Fig 3. Functions in a Management Information System (continued on next page)

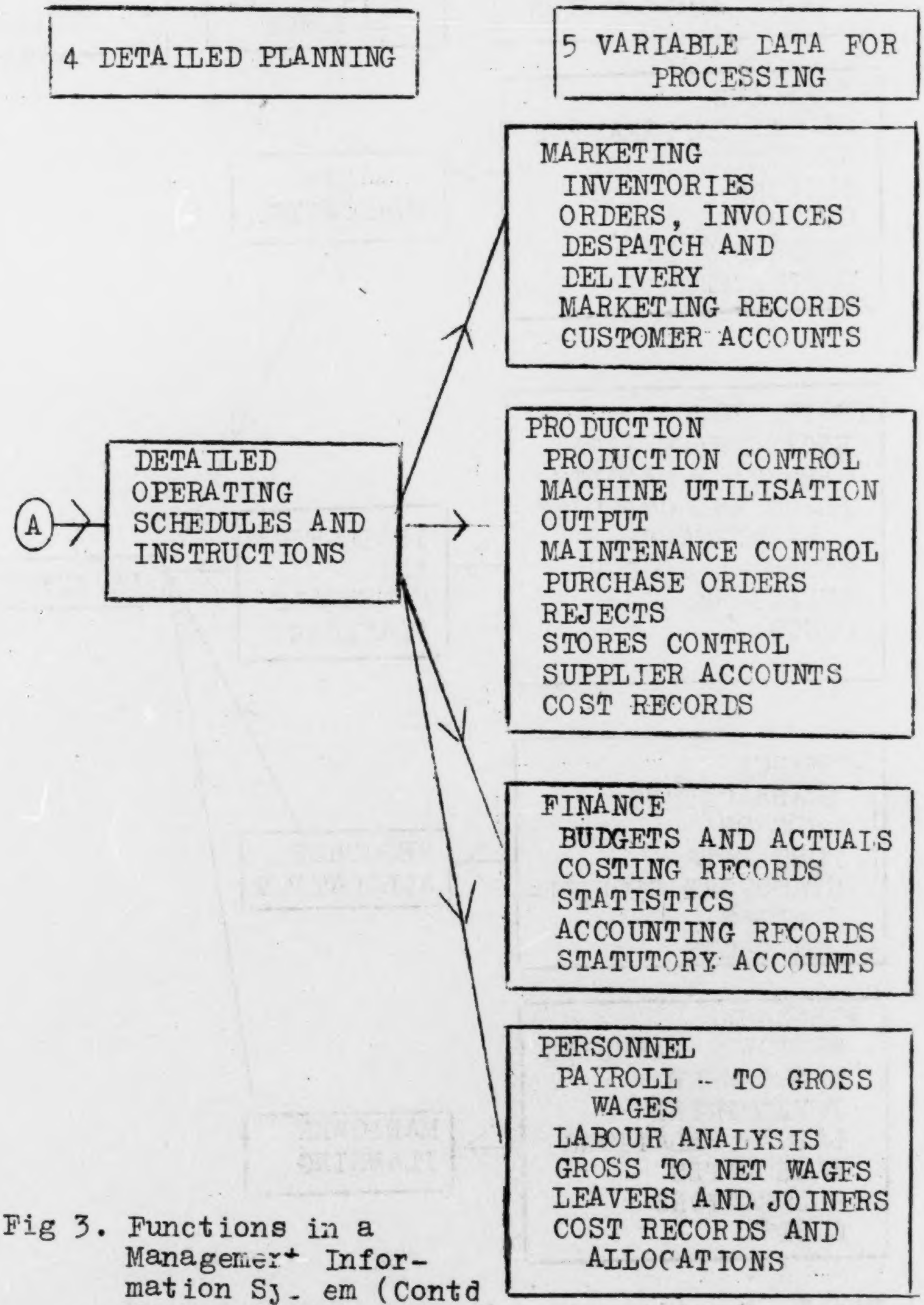

Fig 3. Functions in a Management Information System (Contd from previous page)

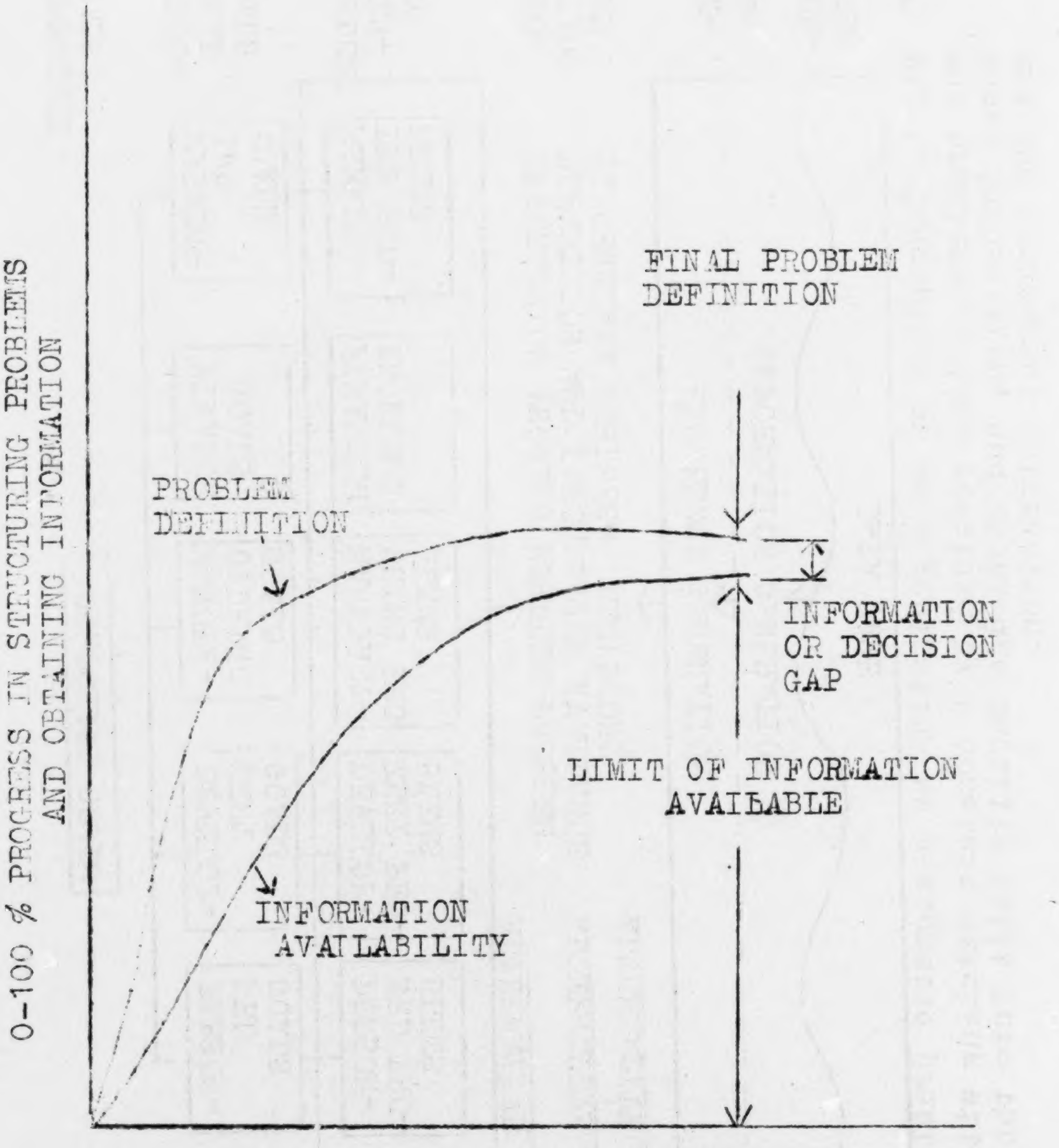

Fig 4. Problem Definition and Information Availability during Study Phase of a Decision

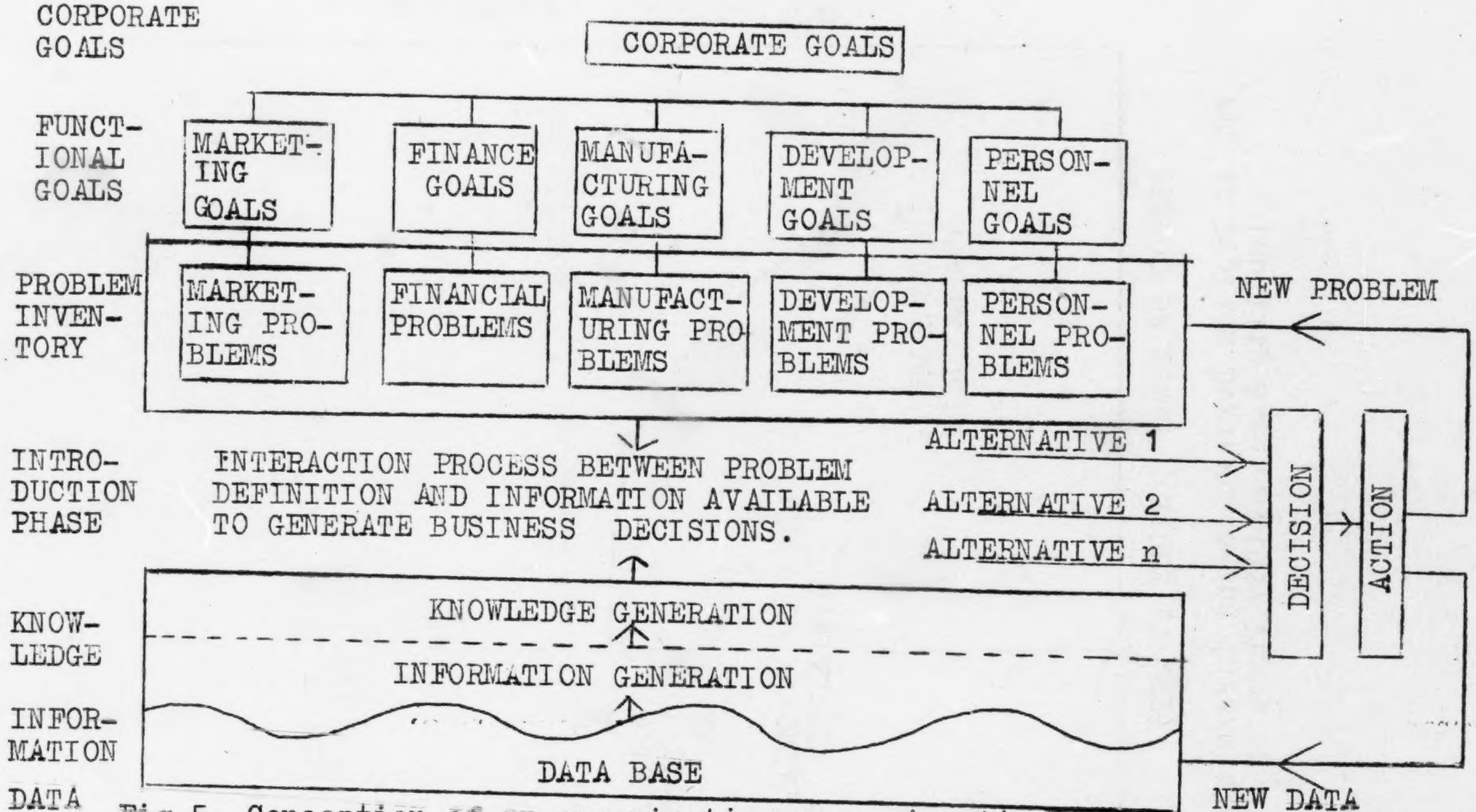

Fig 5. Conception of an organisation as a gignatic problem inventory, the problems getting resolved by a constant matching with the data base, information, and knowledge facility built into the organisation and the consequent interaction.

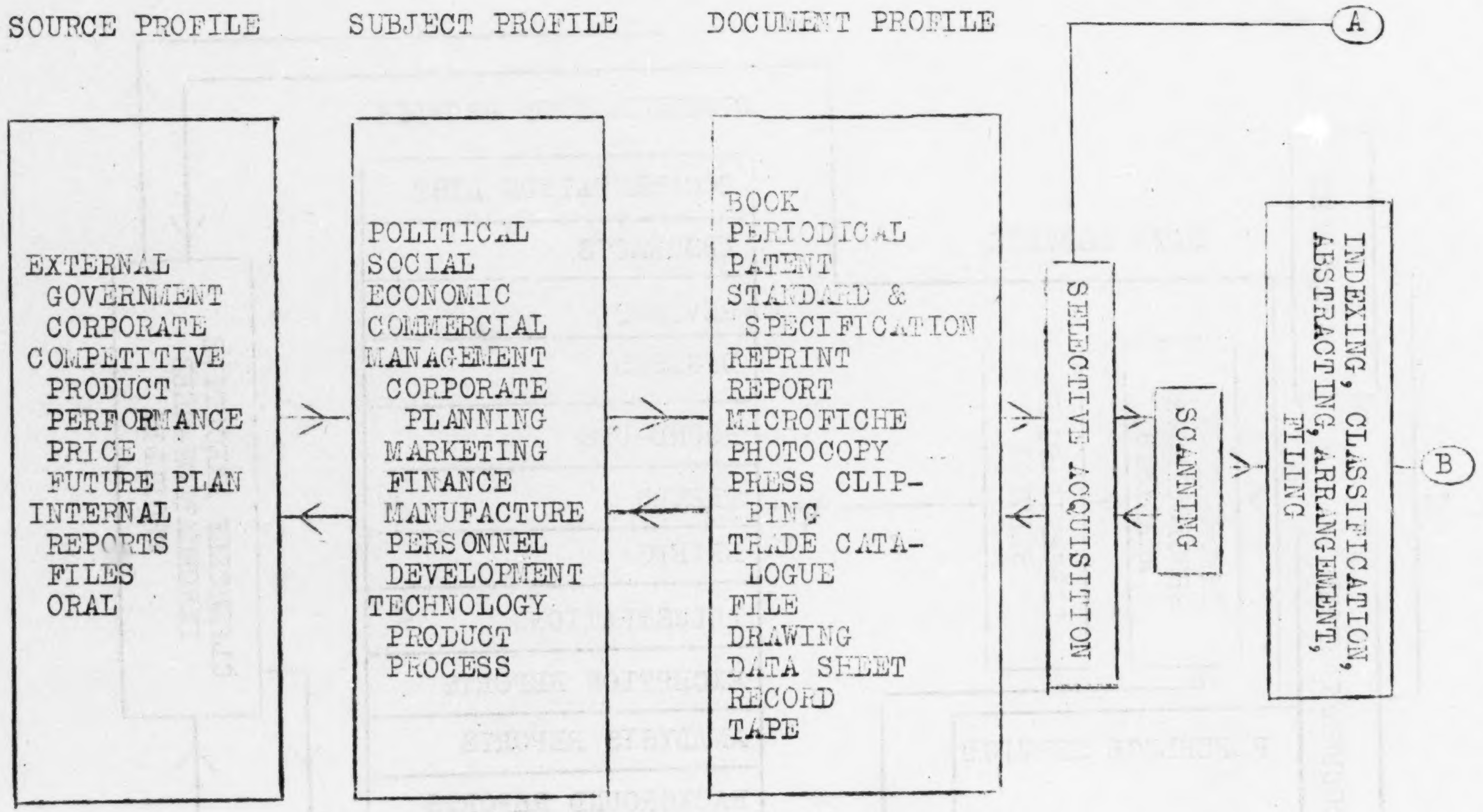

Fig 6. Flow Chart of Activity in a typical Business Information Centre (continued in next page)

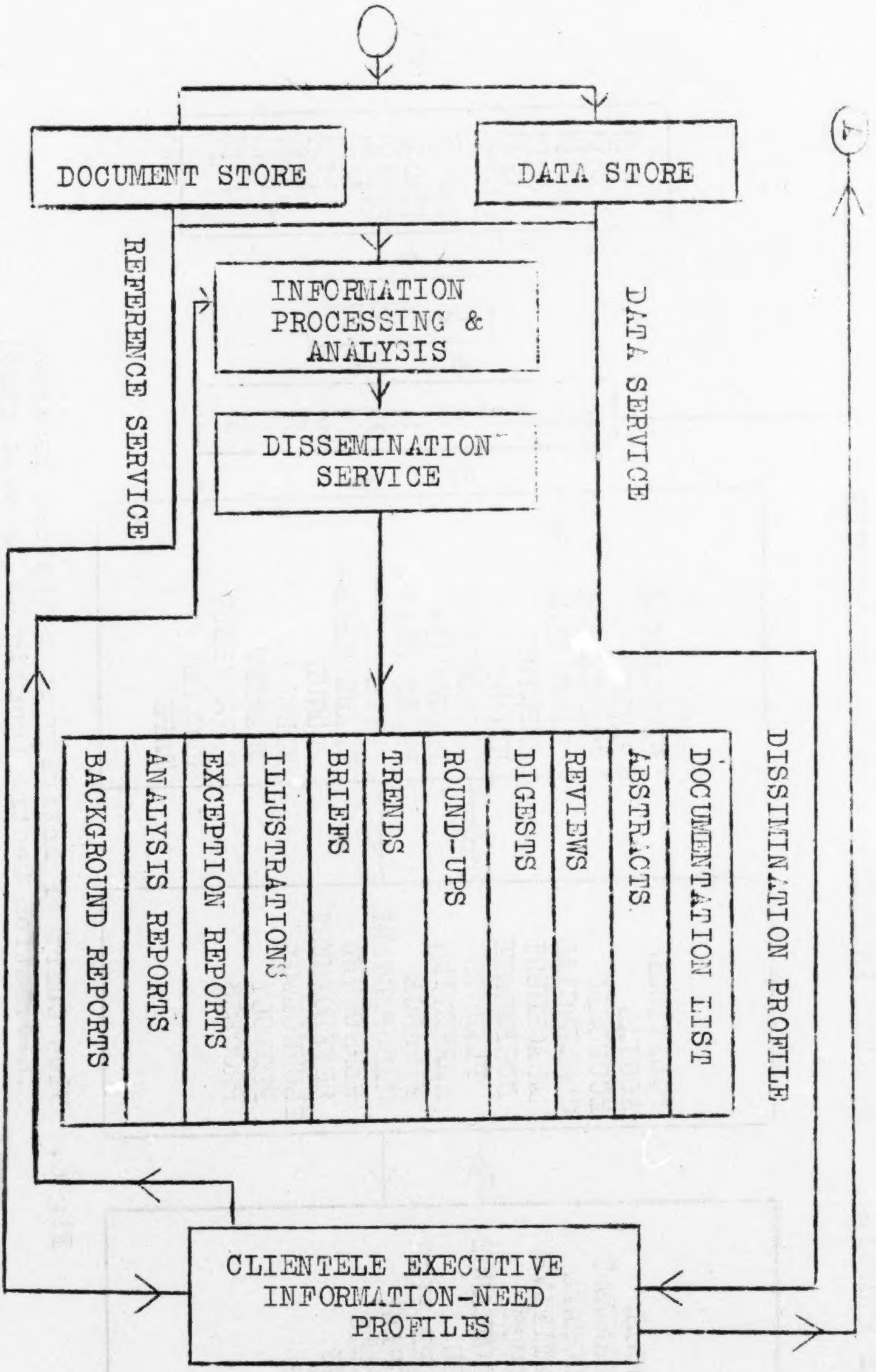

Fig 6. Flow Chart of Activity in a typical Business Information Centre. (Continued from previous page).

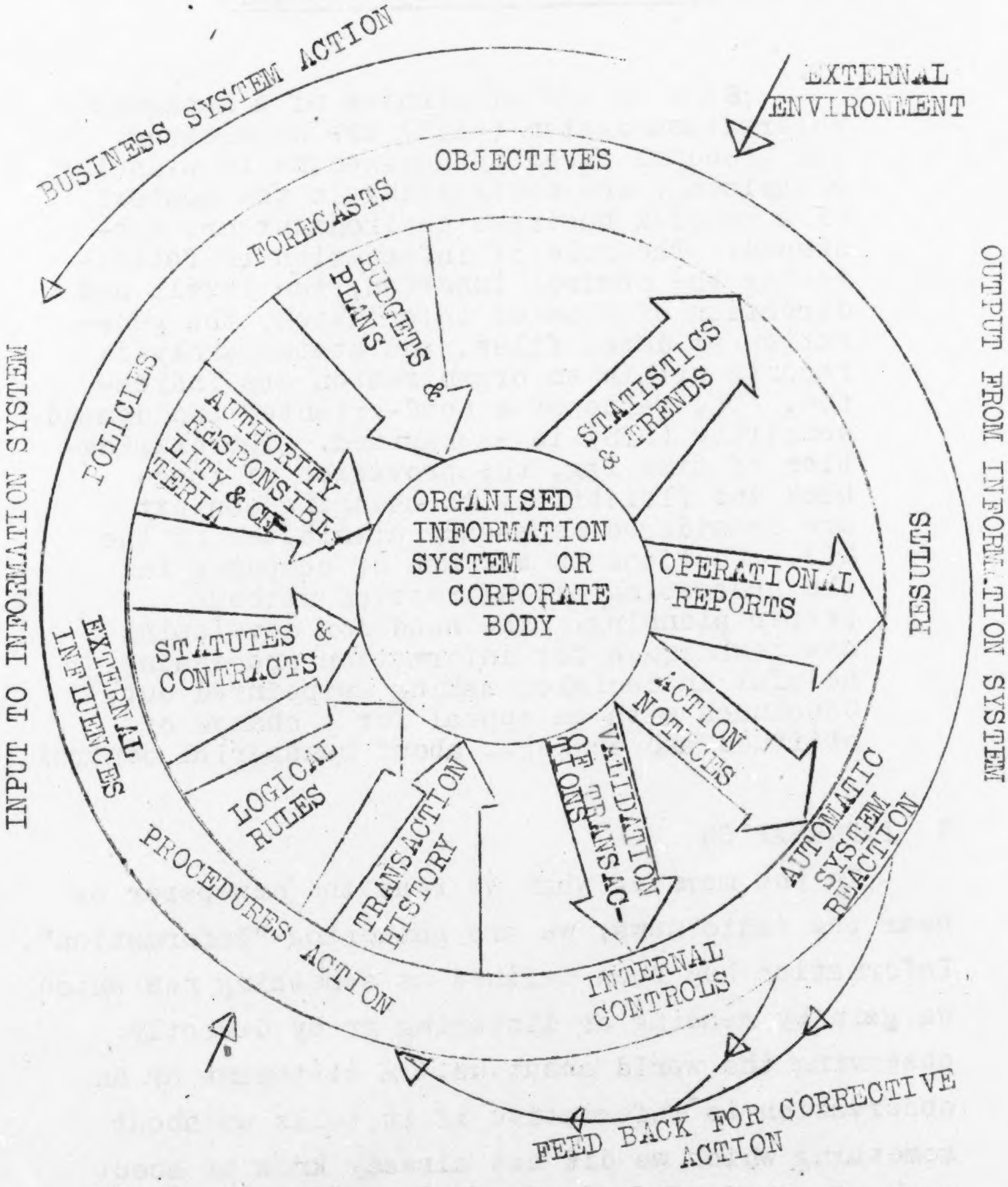

Fig 7. Dynamics of the Typical Business Centre

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MANAGEMENT INFORMATION SYSTEM AND ITS MAJOR ATTRIBUTES.

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Some of the attributes of a Management Information System (=MIS) are considered. The problems faced by management in planning, organising, and controlling in the context of a complex business environment are discussed. The role of information in falicitating the control function, the levels and direction of flow of information, the generation of data, files, and status analysis reports within an organisation are indicated. The value of a need-oriented and demand-sensitive (MIS) is emphasised. The elimination of time lag, the provision of feedback and flexibility to changing context are considered necessary attributes of the MIS. Cautions on the use of computer in the processing of information without proper planning. The need for developing new techniques for information processing helpful in decision making is pointed out. Concludes with an appeal for a change of attitude and concepts about managerial control.

1 INFORMATION

In the morning when we read the newspaper or hear the radio news, we are gathering "Information". Information has been defined as something new which we gain by reading or listening or by directly observing the world about us. A statement or an observation is informative if it tells us about something which we did not already know or about which we are uncertain. Hence "Information" may also be defined as that which removes or reduces uncertainty (7). Information on what is going on within and outside an organization is called 'News'. Yesterday's information, stored for future reference is 'History'. Information is a primary requirement in every walk of life, but it occupies a unique place in the field of management.

2 MANAGEMENT INFORMATION SYSTEM AND CONTROL FUNCTION

Management has four basic functions -- namely, planning, organisation, direction, and control. However, near-unanimity is to be found only in respect of three functions, namely, planning, organisation and control (2). Control, which ensures accomplishment of work according to plan is a basic function of management. It keeps a check on the other functions, leading to successful management. In the effort towards realizing the objectives of an enterprise, control bridges the gap between the thinking-function and doing-function of management. For, it brings to light all bottlenecks and deviations of the actual performance from the planned course of action both in the work-in-progress and in the end result. Control is exercised through a well-organised system which spreads over the entire organisation. This is the Management Information System (=MIS).

3 MIS, PLANNING, AND OTHER FUNCTIONS OF MANAGEMENT

31 An Example

For a better understanding of the role of MIS and its relationship with the other functions of management, let us take an example of a manager -- say, a Production Manager. He is a decision maker. He orders that production of a commodity X should be at the rate of one thousand units per day. The order is passed on to the successive lower management levels and ultimately reaches the production unit. The activity takes place as directed, and the result is recorded and, after processing, is presented to the manager in the form of a report, data sheet etc. The manager compares the results and finds out the deviation, if any, from the planned programme. He plans again, taking into consideration the alternative courses of action to accomplish the goal. Decision is taken and an order is again issued. Thus, the entire circle, control-planning-organisation-direction is completed through the medium of an information system. The information system is linked with control and the control function is connected with planning, organisation, and direction. Control affects and is affected by, other managerial functions. Thus, the information system is connected not merely with control but also with other management functions. In fact, it threads through the whole organisation, making the entire system an integrated one.

32 Scope of MIS

The working of such an integrated system and the effectiveness of control depends upon the information system itself. Just as the brain exercises control over the organs of the human body and converts its demands into positive action by the organs through the nervous system, management uses the information system in achieving its goals. As management is concerned with getting work done by people, the information system is used to keep people working in accordance with the desires of the manager. People are to be informed, guided and directed as to what should be done by them every now and then. Thus, management-in-action comes into existence as a direct result of information system. Hence, MIS is a basic tool for use by management in any enterprise.

4 MANAGER'S PROBLEM

41 Business Trend

The scope of MIS is considerably enhanced due the modern trends in business. These trends include:

1 Continuously increasing size of the business unit;

2 Geographical decentralization of operations;

3 Combination of business through mergers and acquisitions;

4 Development of multiple product lines with varying managerial requirements; and

5 Increasing specialisation necessitated by competition and the pressure of enhanced business effectiveness.

42 Weakening of Link

As a result of this, the executive is often faced with a complex organizational structure with an extended communication line. Too much extension of the lines leads to weakening of the communication system, and a reduction in its clear transmitting efficiency.

43 Layers of Management

The executive thus finds himself more and more removed from a first-hand and intimate knowledge of every aspect of the business, and therefore, remote from the source of information on which to base his decisions. To compensate for this, he surrounds himself with added staff functions and interposes additional layers of management. He usually finds this a moderately successful move but one with diminishing returns. Thus, he has to seek a permanent answer to this problem by other means.

5 CONTROL THROUGH MIS

A more helpful solution can be through improved methods of management. Within this **broad** context, "management" may mean one or more of several things, but its basic constituent is control (3). Such control is maintained through a network of information channels serving as the medium of control. When information is dormant or static, it is of little value to a control system. On the other hand, information in motion is the vital flow of intelligence which establishes the basis for controlling a system (4). Thus, control is ineffective unless there is a strong and efficient MIS.

6 DEVELOPMENT OF MIS

61 Levels and direction of Information Flow

Information, including management information, is growing at an accelerated pace. The problem is to control it and utilise it effectively leading to successful management (5).

For a proper understanding of the problem, let us elaborate a little more on the example cited earlier. This is a highly abstracted picture of the basic management control system, but will suit our purpose.

The order issued by the production manager is of a general nature. It may have to be translated into exact directives in readily usable and understandable and operationally meaningful form to the manufacturing, warehousing and many other activities concerned. Let us assume here, that the item ordered is to be produced at a particular rate, and consists of various component parts to be manufactured in different units. Thus, the order, in the form of directives, will have a different implication to different units.

The detailed directives thus created are then sent to, say another lower order management control loop or unit. The directives are received, decisions taken, and again the orders are passed on to successive lower units, ultimately, say, to the plant or machine operator. The plant or machine operator controls the speed of his machine or plant as per the directive. In a strict sense the operator is also a decision-maker. He takes the decision on the orders he receives and adjusts the operation of his machine accordingly.

62 Collection and Processing of Data

Data on the activity done are collected, processed, and maintained up-to-date so that the various management reports can be quickly obtained. This is called File Processing.

It is helpful to think of files being processed as an 'analog' of the actual business activity. The data about the business, the capital used, the decisions made, the activity that actually occurs (both services and materials processing), and the financial results, are all recorded in files. Thus, at any moment, the files could reflect the actual status of the business. With this analog, it is then possible to select, organise and present information so that management can get a quick picture of the status of the business . In the earlier days a business manager obtained such a picture by 'walking through the shop' (6).

63 Status Analysis

The data derived from the files are organised in such a way as to produce abstract quantities which are meaningful to the manager. This is called Status Analysis. The file processing and status analysis are known as feedback path.

64 Presentation of Information

The final step is the presentation of information to the decision maker. The status analysis is presented by isolating exception or deviations from a planned programme. This helps the manager to take decisions after considering alternative courses of action and again issue fresh orders.

Thus the cycle goes on.

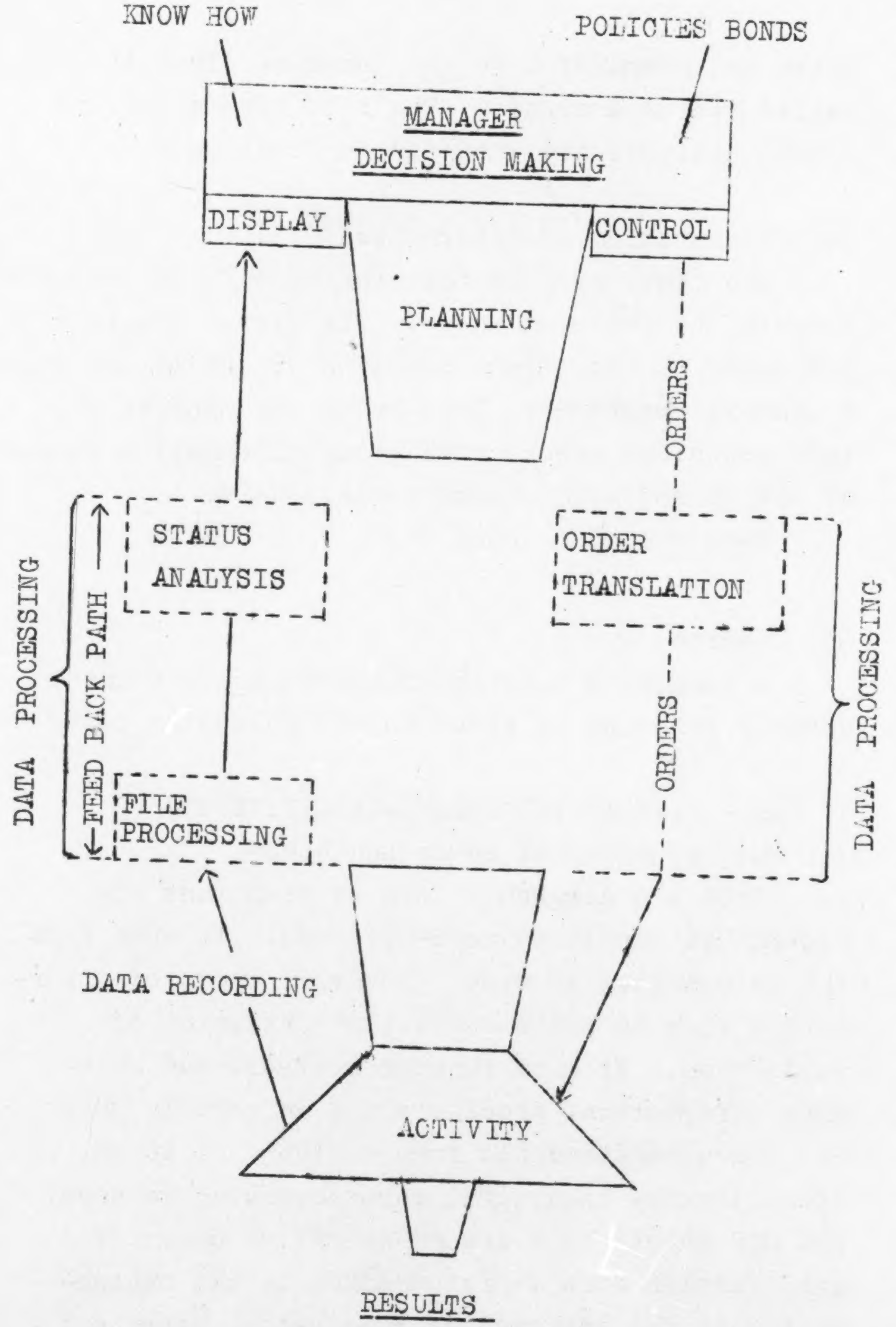
65 Diagram

A schematic diagram of the management and control function is given in the following page.

7 NEED-ORIENTED AND DEMAND-SENSITIVE MIS

71 Understanding of Goals and Needs

From the diagram it can be seen that the modern MIS should be need-oriented. It must feed the information in time. However, speed of information flow is not a sufficient criterion of usefulness. It must furnish reliable and relevant information, precisely and in readily usable and understandable form -- that is, in an operationally meaningful form according to need. The MIS should be a demand-sensitive one. It must furnish each decision-maker in the management with the information required to carry out



Management Information and Control

his delegated responsibility in conformity with the total corporate objectives. This will call for a clear understanding of the company's internal requirements of information helpful in management decision and control, and the complex interrelation between many parts and layers of authority in the organisation.

72 Time Lag

One of the costly elements in any company in the time lag in its managerial, particularly control, activity. A significant aspect of the problem of control is the phasing of time for contigent decision. The flow of information can introduce time lags into the system due to queuing effects (7). Time lag within and between the information flow systems cause or contribute to problems. Such time lags can be avoided either by allotting priorities to various decisions or by screening the decisions. Another means of reducing delay is to have alternative channels for the given decisions. Therefore, an MIS should help to minimise time-lag.

73 Feedback

Feedback is one of the important factors that can affect the functioning of an MIS. If, for instance, due to the inefficiency of the feedback system, timely and reliable information in proper form is not made available, it may lead to wrong decisions. Systematic feedback can make future planning sensitive to the results of previous plans.

This keeps the enterprise dynamic and responsive to new conditions and new ideas. Hence the stress placed on organised, systematic feedback essential for the development of a modern MIS.

74 Flexibility

A modern business enterprise cannot be static. It is continually under the influence of economic, social, legal, political, technological and many other factors. These keep on changing. Hence, the management in modern times is dealing with extremely variable and dynamic situations. For such a dynamic management we need a dynamic and flexible MIS. A modern MIS or control system must be such that it is capable of coping with poor as well as favourable situations in the Company's economic condition. Yet, only in recent years, this key trait of management, -- that is, its dynamic nature -- has received proper recognition in practice. A system in which the capacity for change has not been built-into must either soon be junked or must have its operations suspended while changes are brought into it. A modern business cannot tolerate inefficient operation. Therefore, flexibility must be built into the MIS.

75 Interaction and Relationship of Components

The dynamic relationship between the component parts in an organisation is an important factor for consideration. Any data or information relating to a component has meaning only in its relationship to other pertinent components. Let us refer again to the example we have taken earlier. The production unit is just one of the many units of a large organisation. Production, Finance, Engineering, Industrial Relations, Public Relations, and Sales are examples of other units. These units are interrelated and they interact with each other's functions. The output of one unit may be the input for an other unit. Therefore, an order issued by the top management may have different implications to different units according to their functional responsibilities. However, although units are diversified in their functional responsibilities, they have a common goal -- that is, the company's objective. Hence, any one unit should be viewed as part of an integrated system. In a given situation a managerial decision may be influenced by the interaction of many factors, such as product and market, equipment, facilities and location, finance and capital structure, and economic, political and legal situations. Thus, the multiplicity of the relationships among the factors makes interpretation of the situation difficult.

76 Total Integrated System

A MIS should be a properly coordinated, and integrated one. It implies, for example, that although data collected for one purpose may differ from those collected for another purpose, but such data should be reconcilable with one another.

In a sense, management control is a single system (1). It needs to be a total system because it has to supply information to management about each of the parts of company's operation. This would help examination of the balance between them and such study of the coordination and equilibrium among components is an important management function. Our ultimate goal should be a total integrated all-purpose information system, so that management will have all the information it needs for whatever problems it decides to tackle (8).

8 IMPLICATIONS

81 Characteristics

1 A modern management information system should become instantly active to alert the appropriate people about the exception to expectation.

2 It should be simple enough to permit uniform interpretation of results; otherwise an uncoordinated diversity of effort will prevail.

3 It should be need-oriented, and should furnish correct, precise, relevant and reliable information in readily usable and understandable **form** to the user.

4 It should reduce time lag to a minimum and must have an efficient feedback.

5 It should be flexible and dynamic to cope up with any situation.

6 It should be a total integrated system.

82 Complex Environment

The goal is not easy, for there will be problems of developing the means of planning, measuring, and controlling an increasingly complex assortment of interacting groups with varied motivations and often in a flux of decision-making situations. Progress may be constrained by the growing complexity, both of the business enterpirse internally and of the economy and society in which it operates. There is growing specialisation of work which creates an increasing need for common insight, common understanding, and a common management language without which management decisions however right will become ineffective in action. A persistent effort should be made secure.

An integration of divergent functional knowledge and abilities leading to an integrated and compact MIS, helpful to carry out delegated responsibility of each individual in conformity with the total corporate objectives (9).

83 Caution on the Use of Machine

In achieving such a goal we will have to make persistent efforts in almost every field of management science. The computer can be of help in easing some of the problems. But the question of economic feasibility and unemployment must be faced. A common management language for use in communicating with computers is necessary. Computer simulation of situation is also promising research field. Decision rules have to be formalised such that the computer can be put to better use than merely as a data processor.

With an explicitly stated objectives of the enterprise, finding out what exactly is measurable, what is controllable and what information is needed to make the kind of decision that will help, shape and and influence the future, rather than merely to follow statistical projection of data, is an important task. Findings of research in the areas of recognising and understanding of pertinent factors, their inherent variation, potential for interaction affecting the operation of a business, are useful in developing a MIS. Merely applying data-processing equipment to the refinement of an existing information system may speed up the production of existing reports, but it does little to further the development towards an integrated system.

84 Dynamic Situation

It is to be borne in mind that a complete business enterprise consists of an entangled network of **management** loops and not a series of unrelated functional units. There is 'cross talk' between decision making units and between various activities. We will have to make a dynamic analysis of the entire management effort in order to determine the interaction of its components and their respective information requirements so as to help in the planning, controlling and operation of the business as a whole.

85 New Techniques

We need better methods of separating relevant data from the irrelevant one; new techniques for the interpretation of data and for deriving from them conclusions helpful for the future; and for channelling relevant information to points of decision-making. Attention must be paid to new documentation techniques and proven statistical methodology. We need to know how to translate business needs, business results, and business decisions into functional capacity and specialised effort.

86 Change of Attitude

Over and above all these, there is need for a change in our attitude and concepts concerning managerial control. A dynamic approach to control is concerned with the study of the deviation of performance from the plan. The restrictive approach which assures only the adherence to an agreed upon plan without revealing the deviations is not adequate. The detailed discussion of all the factors enumerated above is not within the scope of this paper.

91 ACKNOWLEDGEMENT

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DOCUMENTATION SERVICE FOR NATIONAL PLANNING.

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The role of information in decision-making and therefore in national planning is emphasised. The major steps in formulating plans -- perspective plan, short-term plan, plan for development of science and technology, and plan for the different sectors of industry -- are enumerated. The different kinds of information required at different stages in the process of formulating the different plans, are mentioned. The recurrence of similar problems and information needs in the different kinds of plans is pointed out. The factors to be taken into account, the organisational set-up, and the steps in organising an efficient documentation system helpful in formulating the plans are briefly outlined. The report is based on work done in Poland.

1 ROLE OF INFORMATION IN A PLANNED ECONOMIC SYSTEM

Every decision about the future must be based on anticipation of the future. Planning consists of the analysis of the present and prediction of relations between facts or phenomena which may occur in the future. In a planned national economy, planning is based on the principle of conscious creation, in the future, of particular commodities and services by working out their trends and range of variations and methods of their production.

Before any perspective decision is made, the planning system requires comprehensive recognition of and information about, all relevant factors so as to minimize the extent of risk in decision making. Thus, in a planned national economy, information plays a very important role in planning and programming future decisions, particularly at the preliminary stage of planning.

11 Experience of Poland

The principles of planning an information system reported here very briefly are based on the research work carried out in CIINTE, Warsaw, Poland. Planning system in Poland consists in working out perspective plans and forecasts confined, as a rule, to five-year periods, and short-term plans.

2 MAJOR STEPS IN PLANNING

21 Perspective Plan

Perspective Planning consists of the following:

1 Perspective plans for economic and social development, basically for twenty years, in which the overall objectives for the country's economy as a whole, is set up; and

2 Development plans for each region or industrial sector of the national economy, specifying trends, tasks and means of achieving in accordance with the overall national plan.

22 Short-term Plan

Short-term planning consists of the following:

1 Five-year plans, subdivided into yearly intervals, specifying qualitative and quantitative growth of of production and other related elements (for example, research and development, employment, supply, etc);

2 Two-year technological and economic plans specifying the conditions for particular production and economic achievements; and

3 Three-monthly or monthly efficiency plans. These are segments of the technological and economic plans and specify more precisely the tasks to be realized according to current conditions.

23 Plan for Science and technology

From the point of view of time coverage, the plans for development in science and technology are similar to the plans mentioned above. There are three types of such plans, namely:

1 Perspective plan of development in science and technology;

2 Five-year plans for research and development; and

3 Annual efficiency plans and supplementary plans updating the five-year plans.

In perspective planning, the general premises of the national economy as a whole are formulated. The overall rate of growth of the national economy, consumer demand, foreign trade policy, employment and capital investment are defined in the plan.

3 INFORMATION NEEDS FOR PERSPECTIVE AND SHORT-TERM PLANNING

31 Perspective Plan

General information needs of planning organs, who participate in formulating the perspective plan, may be stated as follows:

1 Data on specific elements preliminary to the planning process relating to the infra-structure of the country, and of the major foreign ones for comparison;

2 Data on the actual structure, dynamics and development of national economy in various countries;

3 Data for evaluation of the actual situation and trends in science and technology in the world;

4 Information about the actual and perspective models of consumption in various countries; and

5 Domestic and external information about such areas of national economy as will substantially influence global development, in the country and abroad, during the plan period.

32 Short-term Plan

321 Five-Year Plan

Recognition of the actual situation in an industrial sector necessitates the collection of maximum information about similar branches abroad, especially in the highly developed countries. The most important part of this information would relate to:

1 Modernity of product;
2 Speed of production modernization;
3 Rate of growth of productivity;
4 Trends in and rate of change of capital investment; and
5 Production output.

The activities sketched in a perspective plan are specified in the five-year planning. **Five-year** plans comprise also tasks prescribed by organization and technological development plans for specific sectors or branches of the national economy.

To ensure optimum conditions for national economic development during the five-year period, the requirements of national economy as well as the organizational factors must be defined in these plans. A five-year plan, because of its function in the national economy, requires information particularly about the following:

1 Development of production processes;
2 Development of product design;
3 Machines and tools for industrial enterprises; and
4 Consumers' demands for specific goods, at home and abroad.

322 Two-Year Plan

The two-year national economy plan is a base for concurrent efficient supervision of industry and of national economy as a whole. Information needs of an enterprise for building up its two-year plan are chiefly concerned with the types of and capital investment for, machinery and equipment, production space, output, employment, payment, etc. Such data when collected, organised and compared, give a comprehensive picture, from different points of view of the enterprise -- that is, the picture of the present situation and that which it is likely to be in the future.

For the process of planning, it is necessary to collect information about all the factors, with respect to their changes with time, which constitute the overall production activity of an organizational unit.

In the two-year plan, the purpose of information, is to enable comparative evaluation of trends, structure, costs etc, and the effects of production activity.

323 Plan for Science and Technology

Planning system for development of science and technology is an instrument of improvement of supervision in research and development. In the five-year plans based upon perspective plans, tasks are defined for consecutive five-year periods. Information needs for such planning are as follows:

1 Information about the actual situation in science and technology, and achievements upto the present (State-of-art). Such information is essential to plan the appropriate approach to solve a problem. This stage is indispensable in the efficient planning of research and development;

2 Information for evaluation and selection of the best methods and procedures for solving the problem; and

3 Information that can confirm the choice of activities to be carried out within the framework of the problem-solving research.

Information required for working out five-year plans, which specify trends sketched in the perspective plans for development of science and technology would be data on specific technological and organizational tasks to be carried out during the plan period.

4 SOME RESULTS OF ORGANISING INFORMATION ACTIVITIES IN A PLANNED ECONOMIC SYSTEM

41 Integrating Information Service into Plan

From the essence of a planned national economy, several postulates arise for a scientific, technical and economic information system. Decentralization of some planning decisions shows tendency towards concentration of future disposals at those links in the management chain that have collected adequate information about the subject under planning.

The basic purpose of planning information activities is to closely relate future information services to the specific needs emerging from production, service and scientific activities in an organisational unit. Integrating the future information service into a complex plan of the organizational unit, can ensure these information activities being linked with the relevant contexts of objective plans and will be carried out efficiently and in due time. Hence, it will bring the desired benefits to the organizational unit, or to the selected set of them.

The basic role that scientific, technical and economic information should play in the process of planning requires comprehensive data for that purpose. In envisaging the information needs, one should bear in mind that these needs are defined by the content of the objective plans of the organizational units, or of sets of them.

42 Recurrence of Problems and Needs

From the point of view of scientific, technical and economic information system, mutual relations between specific types of plans create and specify the needs of planning groups and help the interdiffusion of these needs. For example;

1 Information needs partly recur in problems of planned undertakings,

11 For perspective planning, and development

and reconstruction planning,

12 For perspective planning in the scale of national economy as a whole and of its regions and sectors, and five-year planning, and

13 For five-year planning, and two-year planning;

2 Similarly, information needs recur in national economy plans and plans for development of science and technology;

21 In perspective plan for the development of national economy, plan of development and reconstruction of sectors, and perspective plan of development in science and technology, and

22 In five-year plans of national economy, and plans for research and development; and

3 Again, Information needs of planning recur between different industrial sectors, and between enterprises belonging to different sectors, especially at the level of technological equipment in industrial enterprises, and in economic matters typical to all organizational units.

In a planned national economy, basic decisions concerning technological equipment and production activity are made in the process of formulating the plans. Therefore, it is important to collect and evaluate information in advance. Information not available immediately during the process of planning can be used, at best, after annual intervals when plans are verified.

5 PRINCIPLES OF PLANNING DOCUMENTATION IN INDUSTRIAL ENTERPRISES AND TRUSTS

51 Coordination and Cooperation

Planning of information activities requires coordination. By such coordination, a signalling system can be established to indicate gap in information needs and thereby help to bridge them as a means of realization of the planned programmes in the organizational units.

When the information needs of users and the ways of satisfying them are specified, cooperation between and among appropriate organizational units is necessary. For example, information about internal market research is of interest to enterprises and their trusts as well as to commercial agencies. A continuous flow of information between them and their participation in information undertakings is also essential. This applies to the field of foreign trade also.

52 External Contact

Direct contact of the information service of an enterprise with the appropriate institutes of the Academy of Science, the departments in higher technological centres, and the industrial research centres, is particularly important.

In the vertical plane, cooperation and exchange of plans should take place between an enterprise on the one side, and its trust, ministry and their respective research centres, on the other. In the horizontal plane, cooperation and exchange of plans should be in the form of permanent contacts between enterprises, their trusts and research centres; and economic cooperation, and inter-relation within trusts and sectors of economy, and other relations in the respective fields of activity.

53 Planning Information Service

531 Factors for Consideration

Collection and evaluation of the information must precede the process of planning for which it is needed. Information obtained in advance is of substantial value, as it enables the recognition and selection of the proper and most efficient trends in research and development.

The preliminary stage at which information needs are recognized and set up, is essential in planning information activities. The plan of such activities should comprise:

1 Tasks concerning the formulation of consecutive plans for an organizational unit, and their updating;

2 Tasks concerning the realization of specific objectives in accordance with the plan worked out and approved for the organizational unit; and

3 Undertakings concerned with incidental (that is, not specified in plans) needs of users.

The planning of information service should also specify the types and forms of information required taking into account among others, the following:

1 Requirements of information users as to the type of information and its coverage (for example, technical and economic data exclusively, technological parameters exclusively, etc); and

2 Maximise the saving of time of the users of information.

532 Steps

The process of planning information activities comprises the following steps:

1 Establishing information needs of users for the period covered by the plan;

2 Working out the plan of the information service about the subjects according to the established needs;

3 Working out the functions to be carried out according to the plan of the information service about the subjects;

4 Defining the scope and means for the information service to carry the activities according to the plan mentioned at Step 5; and

5 Working out the final plan -- that is, a synthesis of or overall view of the tasks and requirements formulated for developing the information service.

533 Study of Information Needs

In studying the information needs, the following should be taken into account:

1 Planned tasks of the organizational unit, or the set of units;

2 Tasks required to work out the documents for planning and programming;

3 Subject information requirements of units, or specialized groups; and

4 Tasks arising from the general profile of the specialized groups served by the information service.

6 LEVELS OF PLANNING

The plan for the information service on different subjects is a base for working out the plan for the different information activities. The latter should specify:

1 Planned tasks, the sequence, and time of the completion;

2 Information level according to the environment of the basic groups of information users;

3 Methods and techniques of organising the information service;

4 Sources of information and timing of their procurement of information; and

5 Specifying the units of the enterprise to co-operate with the information service.

The plan for the information activities is a base for working out the final plan for the information service. The final plan comprises all the tasks to be carried out by the information service according to its means -- material and financial -- during the period. Information derived from the information activities plan and transformed into numerical data and indices enabling quantitative evaluation of the information service activities (such as, collecting, evaluating, compacting of information, editorial activities, etc) is also included in the final plan.

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DESIGN ENGINEER: HIS INFORMATION REQUIREMENTS.

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Information flow in the production-consumption cycle, the functions of a design engineer and the different kinds of information required in the different stages of designing, are outlined. The attributes of 'hard information', 'soft information', 'necessary information', and 'dispensable information' in relation to the design engineer's work are mentioned. The importance of reliability of information, the characteristics and the kinds of information obtainable from documents, such as, reference book, trade catalogue, technical brochure, standards, and specifications of various kinds, data sheet, code of practice, and engineering drawing, are discussed. The need for developing an efficient system for finding specific information from drawings and the work in progress at HMT, Hyderabad, in this regard, are mentioned. The importance of keeping the design engineer up-to-date with the current developments in his subject through documentation service, is emphasised.

1 INTRODUCTION

This paper is mainly based on the experience of library service given to and observation of the working of, a Design Department of a Machine Tool industry. Specifically, it deals with the information requirements of design engineers, who form a part of the Production Management team in the industry. Although the experiences are related to the Machine Tool industry, there would be many points of similarity in the information requirements of design engineers in other industries producing a commodity.

2 PRODUCTION-CONSUMPTION CYCLE AND INFORMATION FLOW

The diagram in Sec 91 shows schematically the Production-Consumption cycle (10). There are four operating groups in the loop -- namely, Production, Distribution, Consumption, and Recovery. Each group is made up of subgroups. Any particular product will draw into action its own array of subgroups. We also notice that GOODS flow counterclockwise with the outward arrow, while INFORMATION necessary for production generally flows clockwise with the inside arrow. That is, the consumer conveys or negotiates with the manufacturer what he needs. The diagram is intended only to show the flow of information.

Whether it is production or distribution that makes the first move, the product must sooner or later meet with consumer acceptance. Hence, the design engineer starts at the simplest statement of ultimate need. For this he uses all reasonable types of information to validate and clarify the need. He seeks to learn the facts and gather information about all the affected links in the supply chain. Thus, he recognises the "need" of the customer, after careful analysis and "Market Survey".

This process of consumer analysis applies to engineering at the highest technical levels as well as to the mass-produced products of low technical sophistication.

3 DESIGN PROCESS

After recognising the "need" in the first phase of the design, the actual design process begins. In the design process the final stage is Communication. That is, giving instructions in the form of a prescription for making the product. The design cycle will start with verbal statement in the form of specifications and contract documents. And these will be translated into engineering terms which will form the design brief. This in turn will be translated into design drawings and manufacturing instructions. Finally, the machining or shaping of the raw materials and assembly of finished product will take place to produce the products required.

31 Definition of Design

Thus we can say that "Design is the creation of instructions for making a product that will satisfy a specified requirement". This definition is broad enough to cover the field of furniture and fashion, as well as the field of sophisticated engineering.

32 Implication of the Definition

The definition implies that for each product the designer must determine and specify:

1 The function, geometric form, materials of construction and surface conditions of each element required in the design;

2 The assembly method, and the inspection and test requirements; and

3 The actual process of manufacture or fabrication but only where his requirements cannot be described in less definitive terms (9).

It is also implicit that the designer operates by the application of known data, known methods, known materials, and known art, to his design problem. If this is not so, the designer cannot say definitely that a product manufactured according to his instructions will satisfy a specified requirement. If certain data are not available to him, and therefore he has to assume them, but the result proves to be in accordance with his assumption, then only he can say definitely that the design would be a success. However, the designer is responsible for recognising the full range of information that he needs to solve his design problem in its correct context. This implies an awareness of all the factors which could cause his design to fail to achieve its objective. The means by which his awareness can be made more precise will also form one of the major information requirements.

Thus, if we accept the above implications of design work, we can now specify the designer's information needs.

4 KINDS OF INFORMATION

The success of the designer depends upon two factors:

1 The availability of information; and

2 The ability of the engineer to rise above the kind of constrained and detailed thinking required in his daily work (8).

Though we do not know much about the kind of information which is needed, yet we can recognise some of the information requirements which will aid the designer in the second factor mentioned above.

41 Reliable and Useful Infórmation

The two characteristics which go to make information important to a designer are:

1 Reliability; and

2 Usefulness.

Uncertainty in an engineering situation is due partly to uncertainty of the information itself. Some information are reliable; and some are represented as reliable, possibly it may not be during the time it is needed.

As an example of unreliability, the Wright Brothers (12) stated that their early machine would fly only in winds of 25 mph, although they had used data from Lilienthal's air-pressure tables indicating that it should have flown at 16 mph. A year later, using a new machine the data from the tables and results obtained did not tally and they decided to run some home-made wind-tunnel tests. Finally, data from those tests did agree with their flight results and the earlier published data were shown to be in error. Engineers frequently encounter similar difficulty: Error in published data that show up only upon a belated proof-test.

This sort of discovery of errors in published data is possible only when there is a feedback of information, from the user customer, regarding the performance of the product.

42 Categories of Information

According to Woodson (11) the information required by a designer falls into 'Hard' and 'Soft' as well as 'necessary' and 'dispensable' categories.

421 "Hard" Information

'Hard' information is verifiable, unambiguous, permanent, documentable, numerical, and checked by several sources, or it has some combination of these attributes. It has maximum reliability when properly transmitted. This is the type of information the designer depends upon confidently.

For example, hard information includes:

1 Principles;
2 Laws;
3 Quantities
4 Standards;
5 Data on present systems;
6 Contracts;

7 Physical relations; and
8 Drawing, photograph etc.

422 "Soft" Information

'Soft' information may be equally or more important, but it is generally nebulous, qualitative, verbal, transient, not necessarily verifiable, or it has some combination of these attributes. Having this nature, it is even more likely to suffer in transmittal, particularly if the communication is verbal. This type of information must be doubly verified, because its importance frequently beguiles the engineer into uncritical acceptance.

For example, "Soft" information includes:

1 Opinion;
2 Market survey;
3 Recommendation;
4 Situations;
5 Hearsay;
6 Projected data on a future system; and
7 Idea, proposal, etc.

"Soft" Information cannot generally be 'proven', even if slightly. Given the same conditions, "Hard" information is likely to be more reliable than "Soft", simply because of the salutory effect of verifiability.

423 Necessary vs Dispensable Information

The terms 'Necessary information' and 'Dispensable information, are more or less self-explanatory. "Hard" and "Soft" information may be either necessary or dispensable because the choice depends on a value judgement or use, but not on intrinsic nature. The value-importance is related to the risk of the pending decision. If the risk is found to be high, or the money or time strategic, then the missing information becomes necessary.

When asking whether certain information is indispensable or not, the designer considers the following factors:

Necessary Information	Dispensable Information
High economic risk without it.	Interesting but not mandatory.
High performance risk without it.	Only slightly reduces the cost.
No other alternative.	Can wait.
High safety risk without it.	Not everyone agrees that it is necessary.
Time is strategic.	

424 Designer's Problem

Various kinds of information intermix in all stages of design. There is no predictable balance between them in any phase or activity. The designer is thus dependent upon his own resources and relies on his own judgement to choose the information. It is here, the librarian has to recognise and provide the resources. They should be available readily. The reliability should be judged on the basis of a proper knowledge of the categories of information mentioned above.

5 NATURE OF INFORMATION

In the light of the discussion in the preceding section, we can categorise the information requirements of a designer as follows:

51 Specific Information in Response to Query

Information required to be supplied on a specific request is usually that which is required in the course of some design work to formulate a "message" through drawings. The communication of this message will demand access to reference and other documents, for data and general information. In response to a specific query some "facts" are to be furnished instead of merely citing documents containing them.

For engineering matters easy access to discrete numerical facts which do not change with time is required. Here, answers to such questions as about the properties of a specific material, or conversion factors from one unit to another etc, are required.

The following are some examples of specific information required by a designer in a machine tool manufacturing firm:

1 Data for strength calculations of machine elements, such as gears, shafts, sprocket and chain, bearings, clutches, belts, etc;

2 Data for design details of springs, castings, weldments, guideways and slideways, etc;

3 Information on the selection of materials; composition of materials etc (See also Sec 545).

4 Data on calculating the machining power, feed power, cutting force etc;

5 Manufacturing information, such as,

1 Tolerance and fits;

2 Process information -- such as, surface finish requirements in design; different processes available and selecting the proper surface finish; and effects of surface on the performance of machine components;

6 Information on the selection of auxiliary equipment such as pneumatic and hydraulic elements and tools; lubrication equipment; motors, limit switches etc; and

7 Inspection procedures.

52 Trade Document

Most of the information mentioned in Sec 51, except items 4 and 7, may be scattered in different sources, including reference books. But two of the most vital, comprehensive, and readily available sources are Technical Brochures and

Catalogues brought out by manufacturers and various Trade and Technical Associations. Trade document is an important source of information particularly for the purchase, production and design staff, who are often concerned with purchase of components from other firms or may wish to compare the designs by other firms with their own. At times, where it is difficult to conceive a design of a new product, on seeing the catalogue of a product which is somewhat similar in design, designers will be able to evolve some idea of the design of the product to be manufactured.

53 General Information

General information to give specific answers to queries which are couched in a less direct form is also needed. For example, it may be necessary for a designer to know the greatest stress for which shell boilers have been designed in certain countries. This may require all known references on the topic being gathered together.

54 Engineering Standard and Design Standard

Most of the 'Hard' information required (See Sec 421) is usually presented in the form of Engineering Standards, Design Standards, and Data Sheets.

541 Standard

A Standard is defined as a "Document formulated by agreement, authority or custom of sponsors, to define a product, material, process procedure, quality construction, operating characteristics, performance, nomenclature and other like facts" (4). For the purpose of this paper "Standardisation" is taken as the organised process of obtaining solutions to common problems. Thus, standards help in eliminating wastage of creative effort in the repetitive consideration of similar or identical problems.

Standardisation is acknowledged by leaders of industry as an absolute necessity for efficiency in any manufacturing and engineering organisation. This concept has led to mass production, interchangeability of parts and components, higher reliability, lower cost, better understanding and liaison between departments of a company, between different companies, and between nations. In industry, standardisation has freed the designer and engineer from many routine tasks and made him more productive.

The design engineer needs good, up-to-date standards. This requires an efficient updating system, so that existing standards may be changed and the need for new standards become immediately apparent. This information is to be provided by the Standards Department of the Company. All designers must have ready access to National and International Standards. In many countries there are bodies issuing standards, some being governmental organisations, others independent bodies. Most standards are not difficult to trace, as the issuing body usually publishes a handbook or year book listing its publications.

542 Data Sheet

In UK, much has been done to implement the recommendation of the Fielden Report with regard to data sheets for designers, following up the Royal Aeronautical Society's excellent earlier work. However, there appears to be nothing similar to the work performed by the Royal Institute of British Architects for the structural and civil engineering fields (5). They provide Data Sheets on building processes, materials and equipment which has been prepared by each manufacturer in a standard form. "VDI Richtlinien", published by VDI (Verein Deutscher Ingenieure -- that is, Association of German Engineers) are useful for the design and production engineer. Similar data sheets brought out in standard form, properly coded should be readily available at hand, for use of the designer.

Some of the technical periodicals publish information not only for designers but also for other engineers, in the form of reference sheets and data sheets. For example,

1 A reference sheet, published in the American machinist (112, N 10;1968; P 68), contains a nomogram designed to save time in determining the weights of coils made from strip of different metals; and

2 A reference sheet on "Compound angles" published in the American machinist (111, N 25;1967; P 167) shows how to set a piece of work to compound angle on a machine, without cut-and-dry methods.

This type of information may not be available in the usual reference books, but has to be provided by the designer. He has to gather or calculate the required information using formulae and other relevant data, everytime in a different situation. On the other hand, these data sheets provide instant answers to a particular problem in varying situations. Sometimes these sheets are available in the form of reprints, either singly or collectively, from the publisher of the periodical concerned.

543 Design Standard / Company Standard

Many companies use design standards to record design relationships used in the manufacture of their products. One form of design standard will usually begin by stating one or more generally accepted facts, mathematical relationships, chemical formulae, etc, and develop the desired information in a logical sequence. From this information, tables or nomographs can be developed as design aids. Another form of design standard accumulates information on a particular subject. For example, general conversion tables which give multiplying factors to convert inches to metres, pounds to grams, etc, and specific conversion tables, such as those used for conversion between Fahrenheit and Centigrade, fractions and decimals, wire tables, etc. Some information of this kind can also be found in reference books. Design standards may cover a variety of subjects and, when adequately indexed, can save the designer and engineer many hours of laborious calculations (2).

544 Other Standards, Specifications and Codes of Practice

Purchase specifications giving the design department's requirements for material to be ordered and the necessary safeguards regarding chemical, physical, electrical properties etc, are required. In addition, a specification may give the inspection procedures to be used. In the absence of such documents the designer's work will remain incomplete. Where no specification exists, or where it may take a long time to prepare the specification, or where a specification can only refer to certain features and is not comprehensive, a "Code of Practice" takes its place. Code of practice generally refers to activities rather than to details of equipment, and normally contains certain recommendations and helpful suggestions (6).

545 Information from Standard

A problem often met with in dealing with standards is that posed by the designer and other personnel of the company wanting an Indian, American, or German equivalent of a material or process quoted according to a foreign standard . For example, a "material equivalent" may be required. Although the librarian cannot be expected to determine the equivalent, he should be able to produce the publications which help the designer or other user to make the conversion for himself. Publications such as Nachschlagwerke Stahlschussel, and Specifications for steel castings, published by BSCRA, are good examples (7).

Another problem arises regarding information on materials produced according to a manufacturer's standard. Such standards are often difficult to trace and to obtain. The only alternative is to write to the manufacturer concerned for the relevant information.

55 Information on Products Already Designed

551 Design Drawing with Numbering System

Sometimes the designer needs information on equipment and parts of it already designed. For this purpose, the unique features of shape and size are used for product drawings of parts, allowing families of shapes to be brought together to facilitate finding the needed information quickly. (Production Engineers may also find such coding useful as it allows Group Technology or Industrial Classification to be used).

552 Design Drawing based on Content

When one does not know the Drawing File

Number, a search through thousands of drawings filed according to numbers will have to be done. Because of the large number of the drawings on file and the amount of information on each, finding one specific item in this way becomes a time consuming job. To solve this, an attempt should be made to analyse the contents of each drawing and compile a Dictionary of Terms commonly used to describe what is contained in the drawing, as has been done in the Pratt and Whitney Aircraft Company (USA) (1).

553 Case Study

A similar problem is being tackled at HMT, Hyderabad, in the case of collaborators' drawings. The designers, with the assistance of the librarian, are engaged in, what may be called as Design-Documentation work, involving the analysis, classification and indexing of the various mechanisms and ideas contained in the collaborators' design drawings. The project is being undertaken to achieve the following objectives:

1 To save the time of the designer in doing repetitive jobs, such as designing mechanisms, done by others;

2 To prevent the use of un-economical and complex mechanisms when simple ones are available; and

3 To create awareness of new productive mechanisms and ideas.

6 CURRENT DEVELOPMENT

Documentation is also necessary to keep the designer up-to-date with the developments in his fields of interest. A large amount of useful information is published today, but many a firm fails to distribute it satisfactorily to the design office. Details of new products, processes, or techniques helpful in getting better results are being reported in most of the technical periodicals. By incorporating relevant ideas, the designer can achieve economy and improvement in the design. Thus, the engineer in general and the designer in particular, should find documentation of new developments a source of ideas. As Scott has noted "the main function of the technical literature is not that of a reference source for consultation but a primary source of stimulation" (3).

7 CONCLUSION

A knowledge of the place of the designer in an industry, his work and his information requirement is of help in rendering effective industrial documentation service. It will help in 'standardizing' the presentation of information to the designer. It will also help in recognising the areas, kinds and the resources of information which a designer relys on and accepts. These factors call for attention to the ways and means of organising the resources, and are undoubtedly important in the design of information services in an industry.

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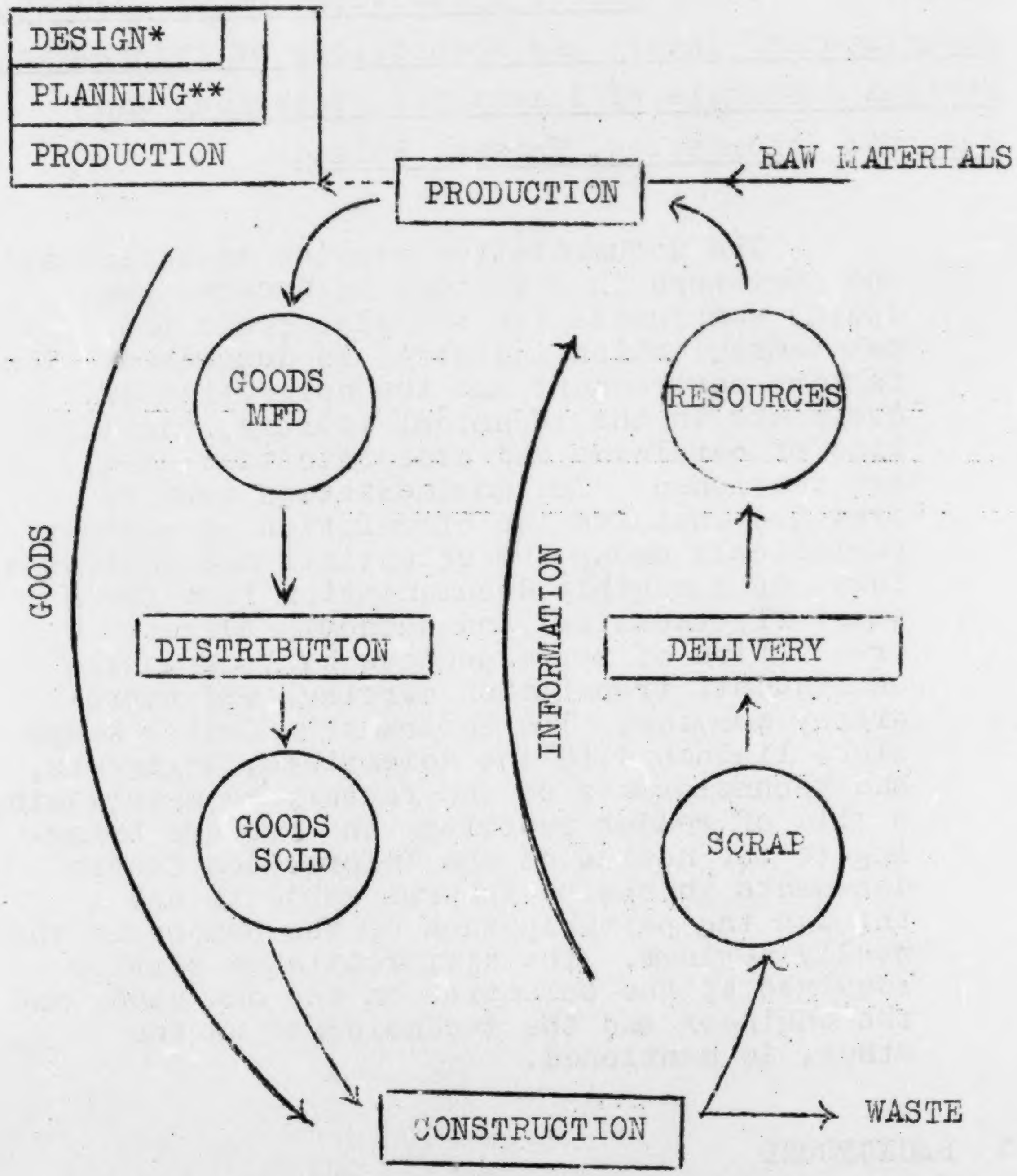
91 PRODUCTION-CONSUMPTION CYCLE DIAGRAM



* DESIGN is a part of PLANNING

** PLANNING is a part of PRODUCTION

DRTC Seminar (8)(1970). Paper CF.

DOCUMENTATION SERVICE TO SCIENTISTS AND ENGINEERS IN AN INDUSTRY: A CASE STUDY.

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The documentation service to scientists and engineers in a factory in Warsaw, producing components for the electronic and telecommunication industry, is described. The factory environment and the collection of documents in the technical library, and the kind of catalogue and classification used, are mentioned. The documentation service provided includes the circulation of current periodicals among the scientists and engineers, issue of a monthly documentation list for a quarterly technical and economic bulletin, preparation of retrospective bibliographies on request, translation service, and reprography service. The Information Centre keeps close liaison with the scientists, engineers, and technologists of the factory by maintaining a file of reader profiles, the readers bringing to the notice of the Information Centre documents in the peripheral subjects and through the participation of the Centre in the weekly seminar. The differentiated service required by the scientist on the one hand, and the engineer and the technologist on the other, is mentioned.

1 BACKGROUND

This paper is based on the experience gained in the Information Centre of a factory in Warsaw.

The factory produces small components which are mainly used in the electronic and telecommunication industries. In organising the library and documentation service for the scientists and the engineers, the following environmental factors are of relevance:

1 The branch of the industry served by the factory is a new and rapidly developing one;

2 The technical progress of the factory is influenced by the research and developmental work done in foreign countries, the information on such developments being derived mainly through published documents;

3 The factory has its own research and development facility, consisting of a Research Laboratory, Department of Engineering and Technology, and an Automation Department;

4 The work relating to the production of components etc in the factory calls for an inter-disciplinary approach. The research and development personnel are, therefore, expected to be familiar with the developments in several subject fields such as, physics, chemistry, crystallography, electrical engineering, and ceramic technology; and

5 The factory is a fairly small one.

2 INFORMATION ON CENTRE

21 Technical Library Collection

The particular characteristics of the work in the factory mentioned in Sec 1 makes the role of its Information Centre in the progress of the organisation an important one. The Information Centre includes a technical library. The library has a collection of relevant primary and secondary documents. Great importance is given to micro documents -- such as, articles in scientific and technical periodicals (either in the form of original articles in periodicals or Xerox and photo-copies), proceedings of conferences, technical reports, patents, and company catalogues. The technical report collection includes those produced by the Research Laboratory of the factory as well those by other institutions. Although books are given much less importance, compendia and collections of data -- such as, Gmelin's Handbuch der anorganischen chemie, and Landolt-Borstein tabellen -- are used frequently. Among the secondary documents are the abstracting periodicals such as Referativnyj zhurnal, Science abstracts, Chemisches zentralblatt, current awareness bulletins and documentation cards (abstracts on cards). A large number of these primary and secondary documents is in foreign languages, mainly in English, Russian, German, and French.

22 Catalogue and Classification

The usual library facilities are provided. A bipartite classified catalogue is maintained. The entries in the classified part are arranged according to UDC. Patents are classified according to a faceted scheme specially devised for use in the Information Centre. A punched card file is being built up on this basis. The non-book documents will be classified according to this faceted scheme. The books in the collection present a wide variety of subjects. Some of the subjects are not closely connected with the fields of immediate interest to the enterprise. Hence, the books are classified according to an universal scheme for classification.

3 DOCUMENTATION SERVICE

31 Circulation of Current Issues of Periodicals

The Information Centre circulates among the scientists and engineers, the current issue of the periodicals received in the library. Along with the issue circulated an annotation for each article indicating its relevance to the interest of the reader is sent.

32 Documentation List

Each issue of periodicals received in the library is scanned by the staff of the centre, and a monthly documentation list is circulated. Each monthly documentation list is in two parts:

1 Entries for articles of likely interest to the personnel of the enterprise; and

2 List of new books and other documents added to the library.

33 Technical and Economic Bulletin

The Technical and economic bulletin is issued quarterly. An issue of it usually contains papers or compilations concerning problems under investigation in the organisation -- for example, discussion of the advantages of new products, comparison of the attributes of the products of the factory with those of analagous products manufactured abroad, etc.

34 Retrospective Bibliography

On request by any reader retrospective bibliographies on specific subjects are also compiled.

35 Translation Service

There is also provision for translation of foreign publications into Polish.

36 Reprography Service

The Information Centre has a Xerox copying apparatus of Polish make, to provide copies of documents requested for readers. In addition, microfilm copies of papers not available in the library of the Centre are obtained from other institutions in Poland and outside the country.

4 READER PROFILE AND FEED BACK

41 Reader Profile

Close liaison is maintained between the users -- particularly those from the Research Laboratory -- and the services offered by the Centre. A profile record is made for each reader. Articles in periodicals and other documents are selected according to these profiles. It helps sending the right document to the right reader. An abstract is sent instead of the original paper if the latter is not immediately available in the Centre. On an indication by the user the original document is procured.

42 Information Exchange

Scientists from the Research Laboratory, from time to time, inform the Information Centre about important documents from peripheral subject areas. These documents cannot easily be spotted out by the staff of the Information Centre as relevant to the interest of the factory.

43 Seminar

Each Saturday a Seminar is organised by the Research Laboratory in collaboration with the Information Centre. The results from selected research projects may be reported at the Seminar. Also, selected recent research papers are discussed. The representative from the Information Centre presents a list of papers relevant to the topic of discussion selected by scanning through their own document search activity. Thus, the Saturday Seminar is a valuable medium for exchange of information among the scientists themselves on the one hand and between the scientists and the Information Centre on the other.

5 DIFFERENTIATED SERVICE

51 Categories of Users

The users of the Information Centre are mainly of two categories:

1 Scientists and engineers of the Research Laboratory; and

2 Engineers and technicians of the department of Engineering and Technology of the Automation Department.

52 Scientist

It is found that a scientist of the Research Laboratory usually has some experience and facility in document search. He may, therefore, prefer to carry out the document search himself and maintain a small private file of abstracts and bibliographical notes. Therefore, the scientist usually requests for the following kinds of service from the Information Centre.

1 Supply of documents required -- original or reprography copy;

2 Scanning the abstracting periodicals from the specific point of view of the subject of interest of the reader. The scanning of the voluminous abstracting and indexing periodicals according to different classification and indexing systems will be a time consuming work for the scientist; and

3 Compilation of bibliographies on a subject in the peripheral or penumbral area of interest to the reader. It has been noted that a specialist

does not usually ask for a compilation of bibliographies or for the conduct of extensive retrospective search of documents in his main or umbral area of subject interest.

Further, many of the scientists are familiar with some of the foreign languages and therefore do not need translation into Polish.

53 Engineers/Technicians

The engineers and technicians of the Department of Engineering and Technology and of the Automation Department require much more assistance than the scientist, from the Information Centre. As a rule, they need compilation of bibliographies on subjects in the main areas of interest to them. The manufacturing processes being a main concern of the factory, the Information Centre provides conprehensive documentation -- bibliographies with abstract, digest, supply of original documents, and translation -- on new methods of manufacturing etc. The engineers and technicians find useful the "Synthetic" compilations -- that is, state-of-art reports and reports of comparative analyses of Polish and foreign products. Also, engineers and technicians need translation of important documents in foreign languages.

6 APPRECIATION

Readers have welcomed and appreciated the different kinds of services provided by the

Information Department.

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DRTC Seminar (8)(1970). Paper CG.

PROCESSING OF TECHNICAL ENQUIRIES IN THE CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE, MYSORE.

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The development of the Central Food Technological Research Institute and the role of technical enquiries in its research programme are briefly described. The organisational structure and method adopted for answering technical enquiries is described, with examples of a few typical replies. The essential requirements for an efficient technical enquiry service are mentioned.

1 INTRODUCTION

11 Development of Food Technology

Food Technology is, in one sense, one of the oldest and, in another sense, one of the youngest of the technologies (3). Many of the processes in use today have remained unchanged in essence since pre-historic times. For example, primitive peoples all over the world smoked meat or dried it in the sun, ground grain into flour and made bread, produced cheese or other fermented products in much the same way as is in vogue today. Some radical changes in processing were made in the early nineteenth century, when Nicholas Appert began the preservation of food in soldered cans. The remarkable speed with which Napoleon mobilised and manoeuvred his armies was in part due to the use of canned foods which were stored (along with ammunition) in suitably located depots. Similarly, World War II saw the introduction of precooked, ready-to-eat and well packed rations, as well as the use of dehydrated foods and beverages, on an unprecedented scale. Modern food technology, based on scientific knowledge, may therefore be said to have come into existence only about 200 years ago, and only very recently have new processes been introduced which were totally unknown to our ancestors.

12 Food Technology in India

World War II provided the impetus for the development of modern technology in India also. Our country became a major source of military supplies to the British and Allied Forces in the Middle East and in South-East Asia. The canning industry was established in India then and many new types of food products were produced for the first time. Under the stress of war, the problem of supplying food to the civilian population was, to some extent, overlooked and the resulting food shortage culminated in the disastrous Bengal Famine of 1944.

2 CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE

21 Establishment

All these war-time experiences proved that it was both necessary and possible to utilise the food resources of the country to provide a balanced diet for the population. As the available resources were by no means abundant, food had to be produced, preserved and processed with the greatest degree of efficiency. This realization naturally led to the establishment of the Central Food Technological Research Institute in 1950, under the auspices of the Council of Scientific and Industrial Research.

22 Function

The main functions of the Institute are to

1 Help preserve the available food supplies by better methods of storage;

2 Augment food resources by developing supplementary and substitute foods from nutritious but hitherto unutilised materials;

3 Improve methods of processing and packaging; and

4 Investigate problems of food spoilage and sanitation.

Studies on such important exported commodities as tea, coffee, arecanut, oilseeds and spices are given their due share of attention. The Institute has the infra-structure and facilities for the sensory and nutritional evaluation of new food products and for scaling up processes to the commercial or industrial level. There is a sizeable programme for training technologists and technicians for the food industries.

23 Early Work on New Foods

In the first ten years of its existence, the Institute developed a few supplementary and substitute foods that could alleviate the near-famine conditions prevalent in certain isolated areas in the country. For example, Nutro-biscuits made from wheat flour and groundnut flour were distributed in Rayalaseema, while synthetic rice made from tapioca flour, wheat semolina and groundnut flour was distributed in Kerala. The Indian Multipurpose Food was developed as a nutritious supplementary food for low-income groups subsisting on poor diets. A great deal of extension work was done to popularize these new foods, and some of the difficulties encountered in this work led to modifications in the new products.

24 Enquiries from the Public

The blaze of publicity that accompanied this activity attracted a large number of enquiries from the public. Most of them related to the nutritive value of various foods, and substitutes for staple and other common foods in short supply. The replies contained a large amount of information on nutritional requirements and the new foods under development. Some of the enquiries even led to experimental work on the nutritive value of well known and highly reputed foods, for example, honey. In due course, two popular periodicals (one in Kannada and one in Hindi) were started to educate the public and keep them aware of the existing problems connected with food and nutrition.

25 Re-organization for Industrial Research

In the next decade, it began to be realized that general education of the public could only be a secondary objective of a technological research institute. It was much more important to establish a close working relationship with the industry; for, the greatest economic benefit could come only when the improved methods and processes are applied on a large scale. To this end, the research programmeof the Institute was re-organised (6) with the highest proprity being given to projects that had the greatestlikelihood of being taken up immediately. It was also realized that industries would require, in addition to basic scientific information, the latest information on technological and economic (or commercial) developments, as well as on standards, patents and legislation. Consequently, a new unit for industrial research and consultancy was organised, and the library and documentation staff were strengthened to extend documentation service.

3 DOCUMENTATION SERVICE

The acquisition programme of the library was intensified. More reference books, monographs, periodicals, and standards were procured. Similarly, increased efforts were made to collect technical reports, reprints, annual reports etc.

Since answers to technical enquiries have to be based mostly on the latest information, the library had to devise a method of facilitating search and selection of information from its collection of periodicals. The indexing of papers published in about 200 periodicals would facilitate this. A broadly classified list of documents (4) was started in 1964 and included in the Library bulletin. As most of the subjects of the papers selected for this service came under one and the same Basic Subject -- namely, Food Technology --, the need was felt to develop a depth schedule for this subject. A provisional schedule was drawn up in 1966, and the articles in Food Technology were separately included in Documentation list for food technology (5). The depth schedule has recently been published (2). At about the same time, the Scientific Information and Publications Unit started publishing abstracts of important papers from about a hundred periodicals, under the title Food technology abstracts (1). A card index is maintained of the documents listed in the Library bulletin and the Documentation list.

4 INDUSTRIAL RESEARCH AND CONSULTANCY

The newly formed Industrial Research and Consultancy (IRC) group consisted of two or three highly qualified food technologists with experience in industry. The Director, who had considerable experience in the food industry, also worked closely with this group. Its function was mainly to review and assess the suitability of schemes and projects, either completed or in progress at the Institute, for transfer to the industry. If any project appeared promising, the laboratory work on it would be given priority and completed as soon as possible. Scaling-up the process in the pilot plant would be undertaken if some party showed interest in the scheme, or if the Director and Executive Council decided that scaling-up was worthwhile.

Very often the IRC group was asked only for advice. For example, three fruit and vegetable canning plants have been set up in the Cooperative Sector with expert technical guidance from the CFTRI. Advice was given on

1 Procurement of raw material;

2 Plant lay-out and flow diagram for the process, including utilization of by-products;

3 Selection of machinery and equipment; and

4 How to overcome difficulties in trial production.

Work of this nature was undertaken mainly by the Chairman of the IRC group in consultation with the Director and the senior members of other disciplines.

5 TECHNICAL ENQUIRIES

Apart from major projects, such as those mentioned above, a large number of enquiries on various technical problems are regularly attended to. Table 1 shows the subject-wise distribution of the enquiries (in English) received during the

51 Table 1. Technical Enquiries Answered during 1964-68

SN	Subject-field	1964-65 Apr-Mar	1965 Apr-Dec	1966 Jan-Dec	1967 Jan-Dec	1968 Jan-Dec
1	Arecanut Technology	4	-	5	4	4
2	Bakery and Confectionery	24	83	48	33	-
3	Biochemistry	18	15	23	19	14
4	Cereal technology	50	-	199	226	327
5	Dairy products	29	-	30	19	18
6	A N and Dietetics	6	7	17	6	12
7	Engineering	9	151	57	54	67
8	Fish, Meat and Poultry	53	161	31	136	158
9	Food additives and spices	20	14	65	119	180
10	Fruit and Vegetable Technology	477	386	579	695	929
11	Grain storage	15	31	103	254	193
12	Microbiology	44	75	76	88	114
13	Packaging	19	16	28	17	40
14	Processing	348	161	199	167	-
15	Storage of perishables	70	-	94	65	-
16	Supplementary foods	185	-	198	226	296
17	Tea and Coffee	14	-	14	19	235
18	Request for documents	175	320	196	203	235
	Total	1,560	1,291	1,962	2,350	2,608

Source: Annual Reports of CFTRI

five years 1964-68. Between 1965 and 1968, the number of enquiries has increased at the average rate of nearly 350 every year. There is no noticeable trend in the variation of the number of enquiries relating to any particular subject.

Data for enquiries in Hindi and Kannada are available only for nine months of 1965. These are given in Table 2.

52 Table 2. Language-wise Distribution of Enquiries.

Nature of enquiry	Hindi	Kannada	English
Technical	131	62	841
General	394	300	450
Total	525	362	1,291

The proportion of general to technical enquiries is 3:1 in Hindi, 5:1 in Kannada, and 1:1 in English, indicating how small an impact technology has made on the common people!

Table 3 shows the kind of enquiries received during the year April 1969 to March 1970. As expected, the technological enquiries are the most numerous, and they are answered on the basis of the work done at the Institute. The enquiries relating to scientific or commercial information, or information on standards, patents, and legislation taken together are almost equal in number to the technological

53 Table 3. Kind of enquiries Received from April 1969 to March 1970

SN	Commodity/Subject	Scientific	Technological	Economical	Standards Patents Legislation	Documents	Training
1	Fruit and Vegetable	195	547	182	30	271	51
2	Meat, Fish and Poultry	28	107	21	2	47	2
3	Cereals	21	136	13	-	39	1
4	Spices and Flavour	24	187	27	6	45	-
5	Packaging	15	7	-	1	3	-
6	Microbiology	43	77	17	4	15	-
7	Bakery and Confectionary products	7	25	-	1	7	-
8	Protein foods	74	199	40	3	91	3
9	Dairy products	4	2	-	-	-	-
10	Tea and Cofee	2	10	1	-	2	-
	Total	413	1,297	311	47	520	57

enquiries. They are answered in most cases, from the information accumulated in the files of the IRC group, or by searching the documents in the library.

6 METHOD OF ANSWERING ENQUIRIES

Most of the enquiries are answered by sending a copy of a standard note or scheme. Model schemes have been prepared for the production of about a dozen food products. They explain the fundamental principles on which the scheme is based, give details of the machinery, equipment and building space required, the addresses of suppliers of machinery, and also the production cost and economic return. About a hundred other technical and non-technical notes have also been prepared, giving the basic scientific technological and economic information required for preparing a suitable production scheme. In case the enquiry relates to a subject which is still under investigation, the latest position is ascertained from the concerned research workers and an answer is prepared in consultation with them. If, after such enquiries, the party shows an interest in putting up a plant, further advice is given by competent persons.

61 Examples

Here are a few examples of the different kinds of enquiries and the answers given:

1 What are the methods adopted in India for testing milk products?

A bibliography of the Indian Standard

Specifications was compiled and mailed; the party was informed that they could be purchased from the Indian Standards Institution.

2 Which books in your field would you recommend as college level texts?

A bibliography was compiled in the library, then referred to the scientists concerned with the training programme for scrutiny, corrections carried out, and sent to the party.

3 What is the latest position regarding the production and marketing of various groundnut products developed by your Institute?

A recent review paper was traced in a foreign periodical and a reprint of it was sent.

4 What can you recommend as a suitable food for a "Survival Ration"? It must be packed so as to last long; the package must be easy to open; the food should provide roughly 5 cals/gm, and not provoke thirst.

Toffees made from Indian Multipurpose Food or hard candies containing ground nut flour were recommended. An offer was made to develop such a product to the specifications of the enquirer.

5 Can you arrange a demonstration of the method for producing groundnut milk?

The party had seen the product in an exhibition in Delhi, several years earlier, and had obtained a copy of the standard scheme for production of groundnut milk. A demonstration was arranged and work is proceeding on setting up the plant at Jalgaon.

6 What method do you suggest for estimating the oil content of olives?

A paper describing a rapid method was traced in a foreign periodical and a copy of it was mailed. The enquirer then requested that the oil content of a few samples of olives be estimated at the Institute by a method other than the rapid method mentioned in the paper. This was agreed to and the request was passed on to the appropriate analytical laboratory.

7 Ginger and Turmeric belong to the same family; why is there so much difference in their post-harvest processing?

Turmeric is processed in a rather elaborate manner mainly to preserve its colour, that is the pigment curcumin. Ginger does not contain any special pigment and hence needs only to be cleaned and dried.

8 Various varieties of arrow-root are available in our forests. Can you analyse them and advise on their suitability for human consumption?

The enquirer was asked to approach the Central Food Laboratory, Calcutta, and the Director-General of Health Services for this sort of advice.

9 Can you advise us on the manufacture of groundnut protein?

As the request came from a plantation firm which used to buy Indian Multipurpose Food, a scheme on the production of this item was sent. Within a week, came the reply that the firm was interested in protein isolate and not in groundnut flour or multipurpose food.

7 PREPARATION FOR ANSWERING ENQUIRIES

Any person who undertakes to answer technical enquiries must be thoroughly familiar with the work of the Institute, and with the information available from documents in the library and consultancy files. Otherwise, he will, all too often, politely regret his inability to advise, and create a bad impression about the institute. In case the enquiry has to be referred to another institution, one must first try to confirm that the other institution has in fact worked on the subject. The answers to enquiries must be to the point and reasonably complete. The intention or the desire of the enquirer must be clearly understood, and the occurrence of situations such as the one described in example 9 in Sec 61 must be prevented. An answer must be given relating to all the points raised in the enquiry; otherwise, the subsequent correspondence may become voluminous. The temptation to do propaganda through answers to enquiries must be resisted at all cost.

In fact, there should be a separate programme for publicity -- such as, the publication of books, popular periodicals, folders, newspaper articles and participation in exhibitions and demonstrations.

8 CONCLUSION

Technical enquiries are of paramount interest to a research institution as they constitute the feedback essential for the planning of an effective research programme. To maintain the flow of this feedback information, the enquiries must be answered completely. The essential preconditions and concomitants of an efficient technical enquiry service are:

1 A comprehensive collection of relevant documents;

2 Indexing and filing of the documents so that the information can be searched and selected with minimum expenditure of effort and time;

3 Preparation of standard notes and schemes with the cooperation of the scientific and technical staff.

4 A publicity programme to attract enquiries, and for the general education of the public; and

5 A well trained staff familiar with the main field of activity of the institution.

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CG91 Dastur and Sangameswaran

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DRTC Seminar (8)(1970). Paper CH.

DOCUMENTATION REQUIREMENTS IN THE GLASS AND CERAMIC INDUSTRY.

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The documentation requirements in the Glass, Ceramics and allied industries in India is discussed. The library and documentation service provided in some industrial organisations in Calcutta is described on the basis of a survey. The documentation work and service provided in the Central Glass and Ceramic Research Institute, Calcutta, is outlined.

1 INTRODUCTION

11 Glass and Ceramics Industry

The Glass and Ceramics Industries (including Pottery, Refractory, Insulator, Glaze, Enamel, and Abrasive) occupy an important place in the industrial economy of the country. There has been considerable technological progress in these industries during the last half a century all over the world. And the developments are continuing. Consequently the number of documents published in the subjects of interest to these industries has been increasing at an accelerated pace. This trend has emphasised the need for an effective documentation system to help the scientist, the technologist, and the managerial personnel in the industries in India to keep abreast of the developments in their respective fields of interest. This, in turn, would contribute to the efficient functioning and rapid progress of the industry.

12 Scope of the Paper

The documentation requirements in the Glass, Ceramics and allied industries in India is discussed. The library and documentation service, provided in some industrial organisations in Calcutta is described on the basis of a survey. The documentation work and service provided in the Central Glass and Ceramics Research Institute is outlined.

2 KINDS OF INFORMATION REQUIRED

The information requirements of the Glass and Ceramics industries generally fall into the following groups:

21 Technological Information

This kind of information, concerned with technical know-how and improvement in techniques, is important in any progressive industry. Such information may pertain to the following:

1 Raw Material.- The information required may include the results of research on:

The properties of various kinds of raw materials;

Discovery of cheaper substitutes for expensive materials;

Indigenous substitutes for expensive imported materials; and

New starting materials.

Such information on raw material has a direct bearing on the economy of the industry.

2 Improvement and Modification.- Development, improvement and modification of process, technique, equipment and products.

The value of information of this kind for the industry is as great as that mentioned in cagegory 1.

3 Testing and Analysis.- Information on testing and analytical procedures, standards and quality control methods, is essential in maintaining standards and in improving quality of products and procedures.

22 Information for Management

The efficient running of an industry requires, in addition to technological information mentioned above, management information of the followind kinds:

1 Raw materials and Equipment: Sources of procurement, quality, price, local availability, need and extent of import, etc;

2 Statistical data generated within the organisation pertaining to production, maintenance, sales, profit/loss etc;

3 Market information and trends such as on

demand and supply of products and services, changes with price structure, and on competitors and their products and services; and

4 General management information including government's economic and industrial policy, export and import policies and regulation, personnel legal matters, etc.

23 Patent

Information contained in patents is of special consideration in an industry that produces a commodity or service. The information in a patent may be of interest to such an organisation in the following ways:

1 The patent claim may be in conflict with the organisation's own interest and therefore, may require some protective action;

2 The organisation may be interested in using the information contained in a patent. For example, it may be necessary to buy the patent right or obtain a licence; and

3 A patent may serve as a source of information on current developments in the field and form the basis for further improvements.

3 SURVEY OF EXISTING DOCUMENTATION FACILITY

Fourteen industrial organisations in Calcutta were surveyed to get an idea about the documentation service provided by each of them to the Glass and

Ceramics industry. The organisations surveyed included manufacturers of porcelain, potteryware, insulator, refractory, scientific glassware, enamelling frits and colours, and enamelware and also two manufacturers of ceramic machinery. Out of the fourteen, four were large organisations and ten were medium and small ones.

31 Findings

311 Large Organisation

1 The larger organisations, some of which are branches of foreign companies, have some systematic method of procuring documents and providing documentation service required in the organisation.

2 Out of the four organisations only two have libraries (attached to their factories) with professional library staff. One organisation has a "Record Section" attached to each department. This section organises the documents received and disseminates information of special interest to the departments of the organisation. Another organisation processes and utilises information mainly at the managerial level.

3 Different kinds of sources of information -- periodical, catalogue, patent, standard, etc, and other reference books -- are procured. Reference service is provided. Internal statistical data are maintained in each of the departments. Additional information is obtained from other general and

specialist libraries, through government publications and from selling, and export/import agents and distributors. Patents are maintained only in two organisations. The source of information about patents are the publications of the government patent office, the CSIR, the Investment Promotion Board, and the CGCRI Documentation list. The other two organisations do not consider such information important.

4 The documents are first scrutinised by a senior officer. He marks out articles of special interest and sends them on to the persons or departments concerned. The document is then circulated accordingly. Extracts and abstracts are made of the articles of particular interest and filed in a special information file for facilitating future document search.

5 Useful information is also obtained from the publications of and participation in, the meetings and symposia organised by various societies such as the Indian Ceramic Society and the All India Pottery Manufacturers Association, of which the organisation may be a member.

32 Medium and Small Organisations

1 Medium and small organisations do not provide any library and documentation service worth mentioning.

2 They depend almost entirely on the Manager or Technical Advisor or other senior staff for obtaining and disseminating the information required in the organisation.

3 The source of information is mostly the small personal document collection of the Manager or Technical Advisor and at times information got from other libraries -- general and specialist libraries and documentation centres.

4 Membership in learned and commercial bodies such as the Indian Ceramic Association, the All-India Glass Manufacturers Federation, and the All India Refractory Makers Association, is another means of getting useful information. These bodies arrange periodical seminars and meetings of the members for lectures and discussions on various subjects of relevance to the industry. In addition, some of the bodies also publish information on current developments in the industry in their regular publications.

5 Technical information on different manufacturing problems is also obtained through personal discussion of the manufacturer with scientists in institutions such as the CGCRI. The industry also makes use of the CGCRI documentation system.

6 Advice and information on market position, demand and supply, and specifications regarding products are provided by the marketing agents and

consumers themselves.

7 Information on raw materials and equipment are usually obtained from buyer's guides, company catalogues, advertisements, government publications such as those of the Directorate of Commerce and through the personal effort of the management staff of the organisation.

8 Little effort is made to keep up to date with the patent situation. There is a feeling that the patents are not of much significance for these small and medium industries.

4 INADEQUACY OF THE DOCUMENTATION SYSTEM

From the brief report of the survey of fourteen industries presented in the preceding section, it is obvious that only a few of the larger organisations in the Glass and Ceramics field maintain a documentation service of their own. The medium and small organisations have to depend entirely on outside sources -- the CGCRI, the Indian Ceramic Association and other similar bodies, and other institutional sources including university and specialist libraries. Thus, any documentation service to this industry must pay special attention and concentrate efforts on meeting the requirements of the medium and small industries. Further, there should also be a proper coordination of the services available in the Glass and Ceramics field, whether it be in the larger industrial organisations or in the various learned bodies, such that the service is available to all the potential users, pinpointedly, exhaustively, expeditiously, and economically.

5 DOCUMENTATION SERVICE AT CGCRI

51 Documentation Service as an Essential Function

The Central Glass and Ceramic Research Institute, Calcutta, is a national laboratory established in 1950 under the CSIR. In addition to its program of research and developmental work, the Institute also has the function of disseminating information, mostly technical, for the benefit of the industry. In the succeeding sections a few of the services rendered by CGCRI are mentioned.

52 Library

The Institute's library has a comprehensive collection of different kinds of documents, on Glass, Ceramics and allied fields. Inter-library loan facility is provided.

53 Documentation Unit

The documentation unit was started in 1965. The following are some of the services of the Unit:

531 Documentation Work

Almost all the documents -- books, periodicals, technical reports, standards, etc -- received in the library are scanned by the staff of the Documentation Unit. Relevant articles and other documents are marked out for preparing entries for inclusion in the CGCRI documentation list.

532 CGCRI Documentation List

This is a monthly publication prepared by the Documentation Unit. The entries prepared for the documents selected are arranged according to the classification scheme of DEC (Documentation Europienne Ceramique). Added entries are prepared as required. The classification according to the DEC scheme provides analysis of each subject into various facets. The main entries are arranged in the classified sequence, and the added entries in the alphabetical sequence to facilitate document search and bibliographical work. Abstracts are not usually provided for each entry. In each monthly issue about 300 micro documents are listed. This documentation list is intended as an "advance documentation list". It is circulated to the scientists in the CGCRI and other national laboratories, several university libraries and government institutions. It is also subscribed by some of the industrial organisations and are finding it to be a convenient means of keeping themselves fairly up-to-date with the current developments in their respective fields of interest. Further, they are also able to procure, in the form of photo-copies, any particular document which they may want to peruse in detail.

533 Bibliography Service

The Documentation Unit also compiles special bibliographies on demand by the subject specialists. These compilations are also of use in the research projects undertaken by the industrial organisations. From time to time short bibliographies are compiled and supplied on the basis of request received in the Unit.

534 .eference Service

The conventional short range reference service is provided. The search and selection of documents is facilitated by the Information Index on card maintained by the Unit. As already mentioned in Sec 532, the index cards arise out of the preparation of the documentation list. The search and selection of documents to answer a specific query is done by translating the subject of the query into the language of the DEC Classification Scheme.

6 OTHER PUBLICATIONS OF CGCRI

61 CGCRI Bulletin

The CGCRI also publishes the results of its researches in a quarterly publication entitled the CGCRI bulletin. This is circulated to the industrial organisations. It provides the latter information on current research in the Glass and Ceramics field. The Bulletin also forms a medium through which the Institute informs the industry of its work, with the possibility of some of the work being utilised in the industry.

62 Technical Circular

In addition to the Bulletin, the CGCRI also circulates to the industrial organisations, from time to time, Technical Circulars. A technical circular usually contains reviews, notes and abstracts on technical topics.

7 ACKNOWLEDGMENT

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DRTC Seminar (8)(1970). Paper CJ.

TECHNICAL INFORMATION FACILITY FOR RESEARCH AND DEVELOPMENT IN THE NATIONAL RAYON CORPORATION.

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The organisation and activities -- research, development, and production -- of the National Rayon Corporation Ltd are briefly described. The work of the Technical Library of the Company is outlined. The kinds of reference questions usually answered and the documentation service -- documentation list, abstracting, preparation of retrospective bibliographies, critical report, translation, and reprography facility -- provided by the library are described in brief.

1 THE NATIONAL RAYON CORPORATION

The National Rayon Corporation Limited is one of the pioneer industries producing viscose filament rayon and tire yarn and cord in India. In addition, the Company produces several chemicals such as carbon bisulphide, sulphuric acid, hydrochloric acid, caustic soda, sodium sulphate, chlorine and chlorine-based products, such as carbon tetrachloride. The rayon yarn is produced in a variety of sizes, types, lusters and colours to meet the variety of demands and applications. Rayon is used extensively in the manufacture of a wide range of fibres suitable for all kinds of clothing. The fibre also has wide application in drapery, upholstéry, and making of carpet and automobile seat cover. In India rayon cord is finding increasing use in automobile tire, V belt for power transmission and in material handling equipment. The chemicals produced by the Company are mainly for internal consumption in the manufacturing processes.

2/3 DIVISIONS OF THE COMPANY

2 RESEARCH DIVISION

21 Main Functions

The Research Division has an important role in the manufacturing operations. For example, it helps in

1 Developing and innovating the manufacturing processes;

2 Determining whether a process would meet the prescribed standards of quality;

3 Recommending refinement in the process conditions;

4 Establishing procedures to ensure maintenance of specific process conditions affecting the quality of the product;

5 Developing new techniques and methods of analysis;

6 Determining and developing substitutes for imported materials, from indigenous sources without in any way reducing the quality of the product; and

7 Finding uses for the by-products.

22 Organisation

The research division was established in 1954. It includes the following sections:

1 Pilot plant for viscose rayon and pulp;
2 Chlorine utilisation work;
3 Textile research laboratory;
4 Physical and chemical research laboratory;
5 Statistical quality control section; and
6 The technical library.

In the new Research Centre, nearing completion, there will be a pilot plant for synthetic fibre. There are about 80 specialists working in the Research Division.

3 OTHER DIVISIONS

31 Production and Control

In addition to the Research Division, there are the following departments in the Company:

1 Rayon and tire cord plants;
2 Development and design department;
3 Instrument laboratory;
4 Process control laboratory;
5 Safety department; and
6 Auxiliary chemicals division.

The Engineering Department includes Civil, Electrical, and Mechanical Engineering units. The administrative offices are located in the factory at Kalyan, and the Sales and Purchase Departments are at the Head Office in Bombay.

32 Work in Some Departments

321 Main Plant

The Main Plant for rayon and tire cord use raw-materials of a high purity for the various processes. To ensure the purity of the raw materials at each stage in the process, the various manufacturing stage are followed up closely to ensure the maintenance of the correct process conditions leading to high quality finished product. Such checking and control of the processes is done continuously for 24 hours a day and every day in the year.

322 Process Control Laboratory

The Research Division helps the Process Control Laboratory in setting up standard procedures, and to evaluate the quality of the incoming materials against standard specifications. Full use is made of all the relevant ISI and other Standards. Where such a standard is not available, specifications are drawn up according to the needs. This helps to create a successive and continuous check up of the manufacturing process: Raw material ⟶ intermediate product ⟶ final product. This method automatically highlights the important qualities required in the product and determines the standards to be set for influencing and controlling the quality.

323 Development and Design Department

This department is mainly concerned with the design and fabrication of as much of the equipment as possible needed for the various processes. For instance, this department has designed complete plants -- such as, sulphuric acid plant, caustic chlorine plant, and sodium sulphate plant. This helps to reduce the import of foreign equipment. The preparation and engineering layout for new processes and for expansion programmes in hand is also the concern of this department. It is staffed by highly qualified chemical, mechanical and electrical engineers and draftsmen.

324 Statistical Method

Statistical techniques are extensively used in research work in most of the units of the Research Division. It is realised that statistical ideas would give an additional dimension to the purely technical way of looking at the problems encountered in the various sections. Experiments are designed and data collected for statistical analysis and interpretation.

4/5 TECHNICAL LIBRARY AND DOCUMENTATION

4 TECHNICAL LIBRARY

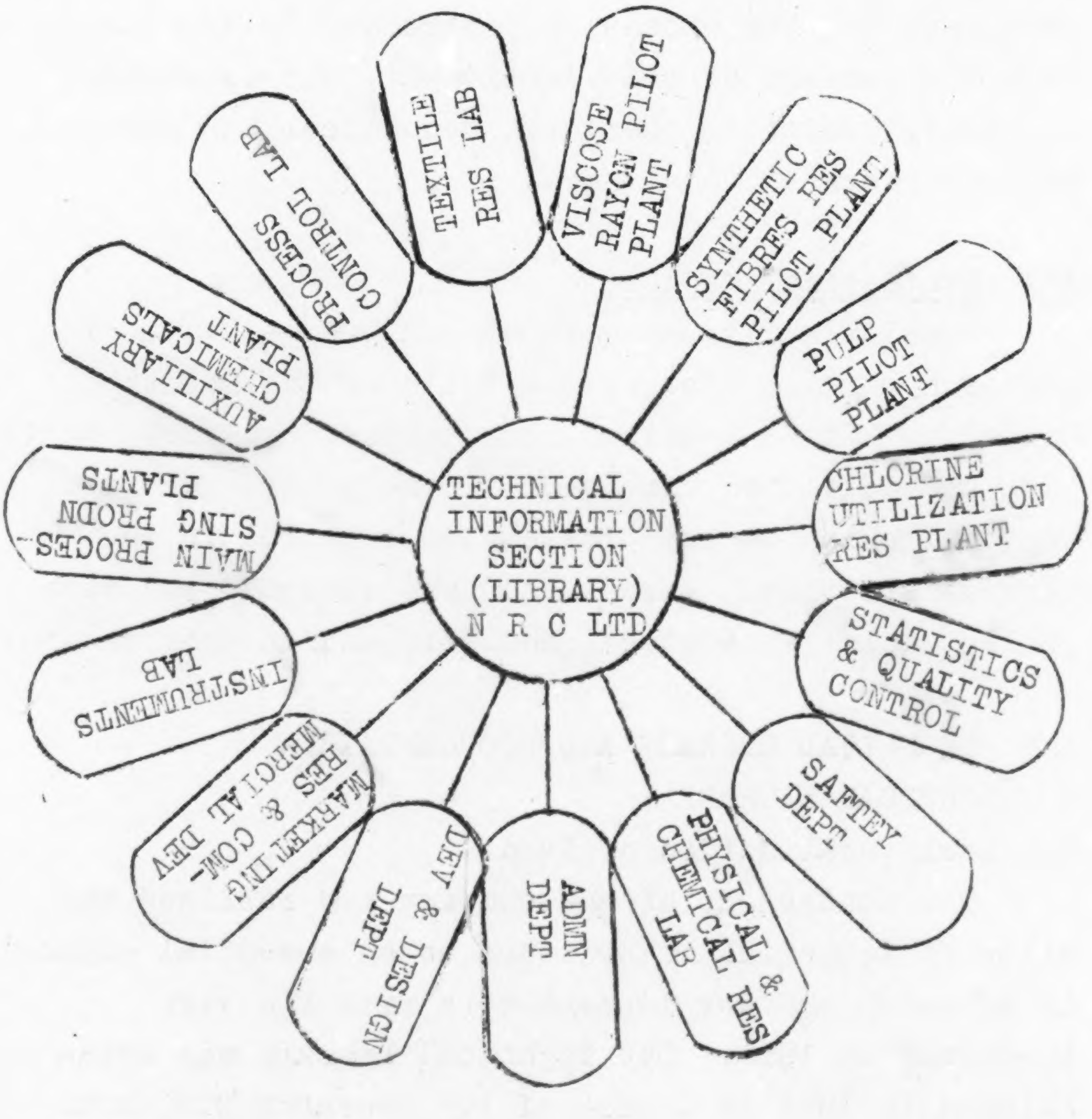
41 Early Realisation of Need

The management of the Company had realised the value of technical information as an essential support in research and development work from its very inception in 1951. The Technical Library was established in 1954 as a unit of the Research Division. It serves not only the research staff, but also those in the production and maintenance departments.

The principal users number about 400.

42 Link with the Divisions

The diagram given below shows the link between the various divisions of the company with the Technical Library.


TECHNICAL INFORMATION SECTION (LIBRARY) N R C LTD
TEXTILE RES LAB
VISCOSE RAYON PILOT PLANT
SYNTHETIC FIBRES RES PILOT PLANT
PULP PILOT PLANT
CHLORINE UTILIZATION RES PLANT
STATISTICS & QUALITY CONTROL
SAFTEY DEPT
PHYSICAL & CHEMICAL RES LAB
ADMN DEPT
DEV & DESIGN DEPT
MARKETING RES & COMMERCIAL DEV
INSTRUMENTS LAB
MAIN PROCESSING PRODN PLANTS
AUXILIARY CHEMICALS PLANT
PROCESS CONTROL LAB

43 Service

The library has about 6,000 books, and receives over 120 technical periodicals pertaining to the subjects of interest to the Company. Documents are also procured through inter-library loan and as reprograph copy from such organisations as the Insdoc, New Delhi. Particular mention may be made of the large collection of manufacturer's catalogues, trade bulletins, reprints of articles, standards, patents, investigation reports of the research division, and data sheets. A card catalogue with entries by subject and name of manufacturer provides easy access to the information contained in these documents.

5 REFERENCE SERVICE AND DOCUMENTATION

51 Reference Service

The library receives a number of queries from the specialists in the various divisions. A sample of such queries is given in the following table:

SN	Subject of Query	Source of Information
1	Calcium hypochlorite production	1 J sci industr res (1951 Nov). Work done at Mettur Chemicals and Fertilizers. 2 U S Patents on calcium hypochlorite (Available in the Library)
2	Coal storage and spontaneous ignition of coal	1 Chemistry of coal utilization. V1. (Published by the National Res Council, USA).

SN	Subject of Query	Source of Information
		2 NFPA handbook (Published by the National Fire Protection Association).
3	Percentage compositions and specific gravity of $NaOH$, Na_2CO_3 and $BaCl_2$ at various concentrations	1 Lange. Handbook of chemistry.
		2 International critical tables. (Pertinent data were taken out, some recalculation made and submitted).
4	Purity of raw materials used in rayon industry	1 Melliand textilberichte. (1932): (Reprint of an article on this subject).
5	Viscosity of 98.5% sulphuric acid at various temperatures and its specific heat	1 Fairlie: Manufacture of sulphuric Acid.
		2 Kirk and Othmer: Encyclopedia of chemical technology
		3 International critical tables.
		4 Perry: Chemical engineer's handbook
6	Manufacture of chlorine and caustic by De Nora's process	1 I E C Modern chemical processes, V3.
7	Sulphuric acid by Contact Process	1 Complete bibliography prepared using Industrial and engineering chemistry, 1912 to 1956. In addition the following were supplied:
		1 BIOS-1631-32-33-34-35-37-40
		2 Modern chemical processes. V1.

SN	Subject of Query	Source of Information
		3 British chem eng. (1958) May and June).
8	Orifice meters for use in measuring chlorination	1 Wallace and Tiermann: Chlorination topics, V10, N1. (Instrumentation in chlorine handling plant)
9	Chlorine handling	1 Solay: Liquid chlorine 2 Reprint of an article on liquid chlorine from National Safety News.
10	Physical and chemical data on chlorine and Mollier's diagram	1 Ullmann: Encyclopedia. V5 and articles in periodicals in chemical engineering.
11	Polystyrene manufacture	1 ACS monograph on styrene, and other relevant documents.
12	"Styrofoam" as an insulating material	1 Styrofoam for low temperature insulation (Chemical eng progress. 44, N9; 1948 Sept).
13	Sodium hypochlorite	1 Trade literature with data and method of manufacture, published by Hooker Chemical Company, USA.
14	Silicones: Properties of silicone grease	1 Kirk and Othmer: Encyclopedia of chemical technology. V12. 2 Boner: Manufacture and application of lubricating greases.

52 Documentation Service

521 Current Literature Bulletin

Since 1960, the library has been providing a current awareness service. Periodicals received in the library are scanned and entries made on cards for documents of interest. Documents are then selected for the quarterly publication Current literature bulletin. It is a mimeographed publication with a printed cover for each issue. The documents are listed under the following broad subject-headings:

1 Chemistry, Chemical engineering, and Applied science;

2 Fibres, Textiles and Cords;

3 Engineering; and

4 Management and administration.

Selected abstracts from abstracting periodicals are given in the "Abstract" section of the Bulletin. A classified list of the books added to the library is also given. The first page of each issue of the Bulletin contains some thought-provoking paragraph under the heading "Thought for the Day". An article of topical importance is also published in each issue of the Bulletin.

522 Bibliography and Report

At the request of readers, bibliographies, critical reports, and literature summary are prepared on specific topics.

523 Translation

Some of the staff members know foreign languages such as German. With their help translation is provided whenever necessary. A number of articles from periodicals such as Chemiefasern, Faserforschung und textiltechnik, Melliand textilberichte have been translated and a copy of each of them is available in the library.

524 Reprography

A photocopying equipment, consisting of one exposure and one developing unit is available in the library. It is used in producing copies of letters, drawings, sketches, pages from books and other documents. About a thousand photocopies are made each year. In addition, hectographing and stencilling equipment are available as a common service in the factory.

53 Use of the Library

The following table gives data about the use of the library by the different departments of the company.

SN	Department	Percentage of Company staff members using the library
1	Research division	40
2	Process control laboratory	14
3	Production plant	23
4	Development and design	10
5	Engineering Departments	7
6	Administration	3
7	Head Office, Bombay	3

6 EXPANSION PROGRAMME

For the growing volume of work in the Research Division the present accommodation is found insufficient. The building of the new Research Centre is nearing completion. It will bring together, under one roof, the different scattered research sections. The Technical Information Centre will be located in the fourth floor. It will have an area of almost four times the present floor space of 1,000 square feet only. It would accommodate 60 persons in the reading room and carrels at a time, and hold about 25,000 volumes. With this additional space the Technical Library would be better organised and the services extended and streamlined.

7 ACKNOWLEDGEMENT

I am grateful to the management of the National Rayon Corporation Limited for permission to contribute this paper to the DRTC Seminar (8)(1970) and to Dr S I Taraporewala, Works Manager, and Shri S V Jigjinni, Deputy Director of Research, for their encouragement in the preparation of this paper.

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DRTC Seminar (8)(1970). Paper CK.

INFORMATION REQUIREMENTS OF THE MINING INDUSTRY IN INDIA.

B D BALIGA, Scientist, Central Mining Research Station, Dhanbad, Bihar.

The mining industry in India is of considerable economic importance. The role of documentation in increasing productivity in the mining industry are discussed. The kinds of information required by the industry for day-to-day-work and for long range planning are indicated. The problems of documentation due to scatter and seepage, language barrier and the inadequacy of the available sources of information are pointed out. In addition to the national abstracting and indexing periodicals, the publication of a bulletin giving information on topics of interest to the mining industry, and production tips, provision of reliable data of commercial and managerial interest, dissemination of information on preventive maintenance and safety practices, the preparation of an annual directory of new products and equipments, the publication of review articles, trend reports, and a monthly abstracting service of selected articles in languages other than English, are suggested as part of the documentation service to the mining industry in India

1 MINING INDUSTRY IN INDIA

11 Contribution to National Wealth

It has been said that the industrial might of a nation can be judged by its annual output of minerals. The Indian mining industry is a major contributor to the nation's wealth and progress. The value of mineral production in 1968 was Rs 3,217 million. Over the last two decades, the mining industry has been developing at a quicker pace. In future, it is expected to contribute even more to the nation's wealth.

12 Low Productivity

At present, the capital investment required to produce any mineral by sophisticated mining techniques is heavy. For example, to produce one million tonnes of iron ore, the capital investment required is about Rs 5.83 crores. In India, 'knowhow' is still to be developed with respect to the optimum utilisation of costly equipment, its preventive maintenance, and in designing layouts for mining.

The problems facing the Indian mining industry include the following:

1 Low productivity in mining as compared to that in the advanced countries in Europe and America;

2 High production cost due to poor mechanisation and increasing wage bill;

3 Lack of indigenously designed and manufactured mining machinery; and

4 Lack of competent managerial staff.

Sophisticated mining methods, such as hydraulic mining, and highly mechanised and automated mining have not been tried in India. To bring down the cost of mining minerals, one solution considered is to increase the pace of large scale mechanisation of mines. During the last twenty years, the mining industry has been switching over from 'pick mining' to semimechanised mining.

1 INFORMATION NEEDS OF THE MINING INDUSTRY

11 Increasing Productivity

The mining industry is in a developing stage in the country. It is essential to avoid wastage through duplication of work already done elsewhere. Further, new ideas should be brought to the notice of the research and development personnel so that they can be exploited to increase productivity in the industry.

12 Kind of Information Needs

Information needs of the mining industry are of two broad categories:

1 Information for use in day-to-day practice; and

2 Information required mainly for long-term planning and future needs of the industry.

2 INFORMATION FOR DAY-TO-DAY WORK

Information on the following subjects can be of help in the day-to-day working of mines:

1 Preventive and break-down maintenance;

2 Cutting down cost of mining minerals, or realising higher output per man-shift;

3 Use of indigenous materials/equipment and spare parts in the place of imported material and equipment;

4 Safety practices and standard practices employed elsewhere under similar mining-geological conditions; and

5 Labour incentives and increase in productivity.

21 Maintenance

The importance of proper use of material and equipment and prefentive maintenance, in order to "keep the equipment running at a pre-determined standard at a cost most favourable to company profit", cannot be under-estimated.

22 Cost of Mechanisation

The Indian mining industry embarking on large-scale mechanisation, would benefit by studying the success and failure and cost of use of costly equipment in other countries.

In India speeds of driving shafts, drifts and other underground excavations are very low mainly due to the manual methods employed. In Europe, South Africa, and USA, speeds ranging from 5 to 20 times than that attained in India has been possible mainly due to intensive utilisation and better work organisation. Information on rapidly advancing faces, face design, intensive shift working and operational planning is of special importance to mining executives for boosting up the productivity and to cut-down the cost of mined mineral.

23 Safety Practice

Information on standard practices, fire-fighting techniques and safety practices is of great value. The National Safety Council of Mines, Dhanbad, is rendering valuable service to the industry by bringing out booklets, and guides in regional languages. As a case in point, the CMRS rendered technical services when fire broke out in one of the largest mines producing about 3000 tonnes of coal per day and employing over 2000 workers. It led to the reopening of the mine at an earlier date and to saving of millions of rupees.

3 INFORMATION FOR PLANNING

Information pertaining to new mining techniques and materials handling, cost data, problems of mechanisation, problems associated with deep mining of minerals under high temperature and humidity, roof control problems, indigenous consultancy services available, and probable future markets for minerals, fall in this category. Indian mining industry can introduce new ideas and practices -- not only those proved successful elsewhere, but can also generate such ideas through research, development, and experience.

Long range capital investment in the mining industry involves large sums of money. Therefore, the planning for the development of the industry should be carefully done and decisions have to be arrived at on the basis of rational analysis of facts and figures. Operations Research, Decision Theory, and other management techniques, and use of Computer can be of help in this planning process. Management should be aware of the developments in these fields.

4 PROBLEM OF SOURCES OF INFORMATION

41 Scatter and Seepage

The information on the developments in mining engineering and allied subjects is scattered in a variety of documents -- book, article in periodicals, technical report, specification, standard, etc. Further, information about even a single topic may be found in documents dominantly devoted to other subjects. This is called seepage of information.

42 Language Barrier

A good proportion of the articles on mining and allied subjects are published in languages other than English. Agencies such as the Insdoc and Iaslic, provide translation from various languages. But the facility is not adequate. Further, the facility for translation from languages such as Polish, Japanese, and Chinese, is far from satisfactory. Some institutions have their own translation facility which, again, cannot fully meet the demand.

43 Inadequate Use of Available Sources

There is no national documentation service for the Indian mining industry. The academic, research, and technical staff in the industry usually depend upon

1 National Coal Board abstracts (United Kingdom); and

2 SMRE abstracts (Safety in Mines Research Establishment).

The Central Mining Research Station and a few mining colleges in India are well equipped to carry out research and to provide advisory service, and information service on a variety of subjects of interest to the mining industry. The latter should take full advantage of this facility.

5 RECOMMENDATION

The following are some suggestions to develop adequate documentation facility for the mining industry in India, in addition to the use of international abstracting and indexing periodicals already available:

1 Publication of a bulletin giving information on topics such as management and mechanisation in the mining industry;

2 Production tips;

3 Collection, analysis, organisation and service of reliable data on various topics of commercial and managerial interest;

4 Information on preventive and planned

maintenance of different kinds of mining equipment;

5 Information on safety practices such as new methods of fire fighting in mines;

6 An annual directory of new products and equipment available, and the services offered by different manufacturers, consultants, etc, in the country;

7 Review articles and trend reports on capital planning, advanced mining system, blasting, and other topics of interest to the industry.

8 A monthly abstracting service of important articles on mining in languages other than English;

9 The industry should come forward to bear a portion of the cost of provision of documentation service by government research institutes or other such bodies which may undertake to provide these services.

6 ACKNOWLEDGEMENT

My thanks are due to Shri A C Mitra, Scientist, CMRS, and Prof A K Ghosh, Professor of Mining, Ismag, Dhanbad, for valuable suggestions. I am also grateful to Dr K N Sinha, Director, CMRS, for his keen interest and permission to contribute this paper to the DRTC Seminar (8)(1970).

DRTC Seminar (8)(1970). Paper CL.

AHMEDABAD TEXTILE INDUSTRIES RESEARCH ASSOCIATION'S DOCUMENTATION SERVICE TO INDIAN TEXTILE INDUSTRY.

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The important place of the textile industry in the economy of India is pointed out. The objectives, function of the Ahmedabad Textile Research Industries Association and its library are mentioned. The various kinds of documentation lists issued, the formation and use of the central information index, the preparation of retrospective bibliographies and other services given by the library are described. Readers' opinion and suggested changes in the services are also indicated.

1 BACKGROUND

11 Indian Textile Industry

The textile industry occupies an important place in the economy of India. The weightage assigned to this industry in the compilation of the index number of industrial production is 32 per cent. The prosperity and progress of the textile industry has a direct impact on the rate of growth of several other industries. Indian textiles currently earn over Rs 100 crores per annum through export. There are 635 textile units in the country. The value of the total assets of the textile mill industry is estimated at about Rs 800 to 1000 crores.

12 ATIRA

The Ahmedabad Textile Industries Research Association (=ATIRA) is the premier centre for research and development in the textile and allied industries. It was established in 1947 as a cooperative research association. Its membership has increased from 71 mills in 1947 to 123 at present, distributed all over India and accounting for approximately 30 per cent of the installed capacity of the cotton textile industry. In addition to the cotton mills the membership also includes allied industries, such as textile machinery, dyestuffs and textile chemicals. ATIRA's major goal is the improvement of the technology, productivity and management of the sponsoring industries. It helps member mills to apply scientific methods to operation problems and to implement the findings of research and development in their day-to-day working. ATIRA's activities are directed along three main lines: Research, Consultation, and Training. ATIRA has at present a staff numbering 281.

2 ATIRA LIBRARY

21 Objective

ATIRA's library is primarily concerned with the provision of library and documentation service to the specialists in ATIRA and to the member industries. The services given to ATIRA specialists are indirectly services to the Indian textile industry. There are also certain library services given directly to the member industries.

22 Library Collection

The documents in the library are mainly devoted to textile and allied subjects. At present it contains more than 17,000 volumes, about 800 standards and patents and about 3,000 pamphlets. The library is now receiving about 400 technical periodicals.

23 Membership

The following table gives data about the membership in the library.

SN	Kind of Membership	Number
1	ATIRA STAFF (can borrow upto 10 books at a time)	201
2	Member Mills (can borrow upto 10 books at a time)	65
3	Personal Membership (Staff of member mills)(can borrow two books at a time)	59
4	Other	20
	Total	345

24 Flexibility

There is hardly any need to emphasise the fact that the number of documents of all kinds in the fields of science and technology is increasing at a tremendous rate. The time at the disposal of the specialist for search and selection of these documents for use is limited. There is also a difference between the information requirement of the technologists and other research workers. The inter-disciplinary character of technology and the dispersal of subjects in a wide variety of documents add to the problem of the specialist in keeping abreast of the developments in his umbral and penumbral subjects of interest. The library services are modified according to the demand. The objective is to develop a library system that can adapt itself to the needs of the clientele from time to time.

3 INFORMATION BUREAU

ATIRA maintains an Information Bureau to meet the document requirements of the specialists in ATIRA and also the mill technologists. The functions of the Information Bureau are as follows:

1 The management of a library;

2 Publication, including various kinds of documentation lists;

3 Document search and preparation of abstracts;

4 Arranging for translation of documents into English;

5 Procurement of documents in original or as photo copy for use of specialists;

6 Distribution and sale of ATIRA publications; and

7 International liaison to maintain contact with important textile research institutes.

4 INFORMING THE READER

Each kind of documentation service is made up of a group of sectors with a library as its centre. The following publications are used to inform the reader about the documents available in the library:

1 Regular publication

11 Current information bulletin,

12 Current textile Literature, and

13 Recent additions list;

2 *Ad hoc* publication

21 Various lists published by the library as and when needed, and

22 Publications of ATIRA.

In the succeeding sections, some of the services and publications of the library are briefly described.

5 DOCUMENTATION SERVICE

51 Circulation of Periodicals

The library circulates the current issues of 25 periodicals to 9 senior research workers of ATIRA. This helps the research workers being kept up to date with some of the most important nascent micro-documents in their respective fields of interest.

52 Abstracting and Indexing Service

521 Coverage

The abstracting service was started in January 1966. Out of the 400 periodicals received, 130 are scanned and abstracted by 52 research workers of

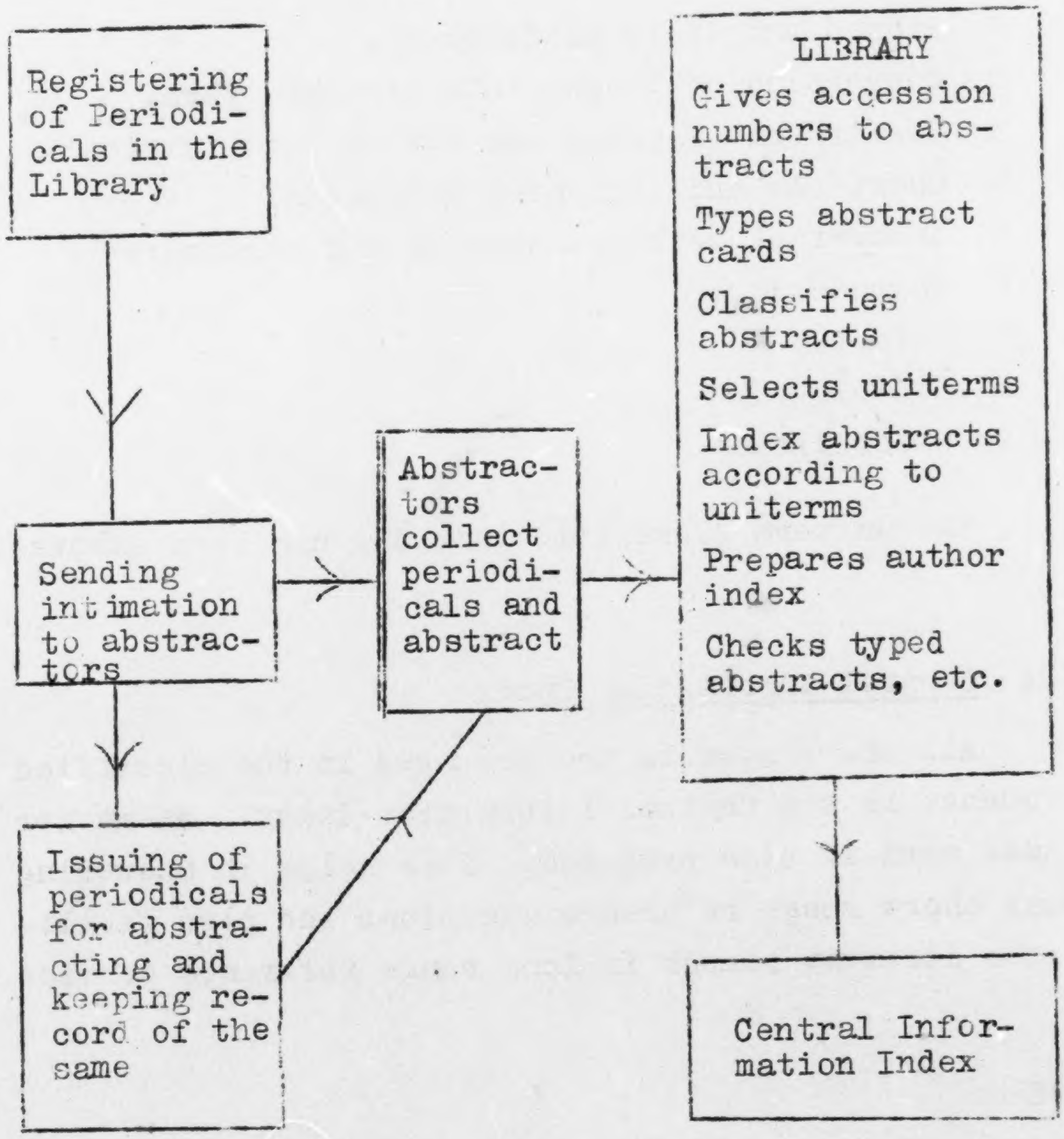
ATIRA. The classification and indexing of the articles is done by the library. Until now about 2,500 articles have been abstracted. The abstracting is confined to the articles in periodicals received in the ATIRA library. However, it is a primary source of information and often supplements the different international abstracting periodicals. The abstracts are not exhaustive but selective in respect of the subject-fields. A larger number of foreign periodicals than Indian periodicals are abstracted. The following table gives data about the abstracting work:

SN	Particulars	Number
1	Number of periodicals received in the ATIRA Library	400
2	Number of periodicals abstracted in ATIRA	130
3	Number of periodicals abstracted in World textile abstracts (WTA)	632
4	Number of periodicals received by ATIRA Library out of those abstracted by WTA	128
5	Number of periodicals abstracted in ATIRA out of the 128 covered by the WTA	64

Thus, about 10 per cent of the documents on textiles published throughout the world is abstracted in ATIRA. This constitutes about 32 per cent of the total number of articles in periodicals received in the ATIRA Library.

522 Abstracting Personnel

The preparation of abstracts of the scientific and technical articles being a specialised job, it is best done by a person who has the knowledge of the subject. Taking into consideration the fact sent the ATIRA Library cannot afford to have full-time subject specialists as abstractors, it has been found helpful to have the abstracting done with the help of research workers. The classification etc is done by the library staff. The following hart shows the routine of preparation of the abstracts.


Registering of Periodicals in the Library
Sending intimation to abstractors
Issuing of periodicals for abstracting and keeping record of the same
Abstractors collect periodicals and abstract
LIBRARY
Gives accession numbers to abstracts
Types abstract cards
Classifies abstracts
Selects uniterms
Index abstracts according to uniterms
Prepares author index
Checks typed abstracts, etc.
Central Information Index

523 Classification

At present, there is no one scheme for classification suitable for classifying micro documents in the field of textiles and allied subjects. The special scheme for classification used in the World textile abstracts has been adopted. The entire field of textiles is divided into nine broad subjects and each is further divided and subdivided. The following are the major subject divisions in the scheme:

1 Fibres and their production;
2 Conversion of fibres into finished yarn;
3 Conversion of yarns and fibres into fabrics;
4 Chemicals and finishing processes;
5 Analytical methods, testing and structure;
6 Engineering;
7 Science;
8 Sociology;
9 Generalities.

The uniterm coordinate indexing has been adopted.

524 Central Information Index

All the abstracts are arranged in the classified sequence in the Central Information Index. An author index card is also prepared. This helps in answering many short range reference questions and also facilitates document search in long range reference service.

525 Specimen of Typed Abstract

20.5 cms

CN 7.33 GREENWAY (R)

Digital Computers in Dyehouses

Dyer
Vol 136, N 11, p 839, December, 1966.

13 cms

Acc N 547

The control of the dye sequence in winches, jigs and beam dyeing vessels using automatic programming devices have been discussed. Main controls over time and temperature can best be made provided other useful information like pH, temperature, presence of dye etc are supplied to the computer. It is conservatively estimated that one computer can handle in excess of 150 different dye sequences simultaneously. Other advantages have also been discussed.

HUM

526 Suggested Changes

Recently, ATIRA's Policy Committee on Library and Communications suggested a few changes which are mentioned below. It is expected that these changes will save a considerable amount of time of the research worker. It may be utilised partly atleast for abstracting a larger number of periodicals.

1 An extra copy of the World textile abstracts (one side printed) to be obtained by air mail;

2 Divisional heads to mark the abstracts of

interest to the clientele. These will be only for periodicals received in ATIRA Library;

3 Periodicals not covered in WTA and received in ATIRA Library to be sent as usual to research workers for abstracting; and

4 Marked abstracts to be cut and pasted on catalogue cards and other necessary entries to be prepared by the library as usual.

53 Current Information Bulletin

The Current information bulletin was first published in September 1968. This is a monthly classified list of the articles selected from the latest periodicals received in the library. It is distributed to the specialists in ATIRA to keep them informed of the articles in the periodicals received in the ATIRA Library. About 150 periodicals are regularly scanned in the preparation of this Bulletin. In 1969 about 1,350 articles were included in the Current information bulletin.

Research workers have generally found the Bulletin quite useful in keeping themselves informed of the current developments in their respective subject-fields. However, there is perhaps one negative effect. A few research workers, who were regular visitors to the library, are not coming now so often. They come to the library only when they find some article of interest to them notified in the Current information bulletin.

54 Current Textile Literature (abstracts)

541 Objective

The first issue of the Classified contents list (old name of the present list) was published in September 1951. The preface to the first issue reads as follows: "In order to provide the reader interested in textiles a rapid survey of the current literature in textiles, ATIRA has undertaken to prepare henceforward a list of articles, classified according to subjects, from about 35 selected periodicals received in the library". Until 1963, it was a quarterly publication. In 1964, the title was changed to Current textile literature with abstracts. And it became a monthly. The abstracts were mainly made on the basis of the author abstract found in the article.

542 Changes

In April 1968 the utility, the content, and procedure followed in the publication of Current textile literature was reviewed and the following decisions were taken and implemented:

1 Only abstracts of articles of interest to mill technologists to be included; and

2 Such abstracts have to be selected from the articles abstracted by ATIRA research workers for the Central Information Index.

Thus, the present Current textile literature with abstracts is slanted to the information requirements of the mill technologists. It is published bi-monthly. Duplicated copies are distributed to the member mills and to ATIRA staff. A few foreign institutions also receive it.

543 Specimen Entry

HEALTERS (M) and HERMANN (G).
Problems and causes of faults in piece dyeing with vat dyes. (In German)
Melliand Textilberichte (German Edition), V 50, N11, p 1325, November 1969.

Common defects encountered in piece dyeing of cotton fabrics with vat dyes are discussed. The causes of such defects have been classified into (a) raw material (b) pretreatment (c) incorrect processing (d) non-optimal dyeing and choice of dyes (e) machine faults. Each defect is analysed with reference to possible cause. Some remedial measures have been suggested.

(BVI)

544 Readers' Opinion

The service has been found very helpful to mill technologists. It is difficult to estimate the actual extent of the application of the knowledge gained through the Current technical literature in the work of the mills. The following specific opinions and suggestions have been noted:

1 Current textile literature should have

11 A list of the periodicals abstracted in each issue,

12 An Alphabetical index to the classified part,

13 An annual cumulative subject index and author index;

2 To publish the list in separate sections to meet the individual needs of persons specialising in different subjects;

3 To distribute the list to the mill technologists directly.

55 Document Search

551 Preparation of Bibliography

This is a major service offered to research workers in ATIRA and to the member mills. At the request of an individual or a mill, the library undertakes search of documents of all kinds -- book, article, report, patent, standard etc -- and prepares a bibliography. Some of these bibliographies have been published. In any case, a copy of it is maintained in the library and announced in the Library bulletin, in the recent additions list, and in the ATIRA Newsletter. During the period 1952 to 1970, the library has prepared 94 subject bibliographies containing 4,245 references. In most cases an abstract of the document cited is also given in the entry.

552 Procedure for Search

The main steps in the procedure generally adopted in document search are as follows:

1 Determination of the scope of the subject, the need of the user, and the definition of terms;

2 Checking the Central Information Index, abstracting periodicals, annual reviews, progress reviews,

review articles, and similar publications;

3 Preparing an entry for each of the documents selected on a 8" x 5" slip with full bibliographical details and an abstract;

4 Arrangement of the entries under broad subject headings;

5 Preparing the bibliography in a typed or mimeographed form.

Before preparing a complete bibliography, the documents for one or two years are surveyed and a list of the selected articles is sent to the reader concerned for comments. On receipt of the comments, the complete survey is undertaken according to the specialised requirements of the reader.

553 Readers' Reaction

Regarding the compilation of bibliographies by the library, there is a difference of opinion among the research workers. Some feel that the compilation of bibliography is properly the work of the library staff whereas others feel that the research worker is more competent to do it. However, the service is appreciated by the research worker who has actually utilised the bibliography. It is invariably appreciated by the mill technologists. Unitl recently the document search was a free service. Now a member mill is charged at the rate of Rs 10/- per hour spent by the libraroan on this work.

354

56 Reprography Service

ATIRA has a well-equipped photography section. Photostat and microfilm copies of articles in periodicals and pages from books are made available at cost.

57 Translation Service

A large number of documents on textiles and allied subjects is published in languages other than English -- such as, Russian, German, French, Italian, and Japanese. Translations of important articles in some of the above languages are made into the English on specific request. On receipt of a request for a translation, a check is made to find out whether an English text is already available. If not a translation is arranged for. All such translations are announced in the Library bulletin. At present the library has English translations of 135 scientific papers from various languages. A complete list of them has been published.

6 OTHER SERVICES

61 Recent Additions List

This is a weekly publication listing the latest books, pamphlets, standards, patents, etc added to the library during the week. The translations and bibliographies prepared by the library are also included. The entries are arranged according to the UDC. Wherever found helpful an annotation is added to the entry. Mimeographed copies of the list are distributed to the ATIRA research workers and member mills. Apart from this, the arrival of a new document, suggested by a reader, is immediately notified to him.

62 _Ad hoc_ Publications of the Library

Until now the library has published the following _Ad hoc_ lists to meet the demands of readers:

1 List of ATIRA publications, up to March 1970;

2 List of papers published in various scientific and technical periodicals by ATIRA research workers, up to March 1970;

3 List of papers presented at various seminars, conferences etc by ATIRA research workers, upto March 1970;

4 List of British standards, specifications, handbooks, special issues and codes of practices available in ATIRA library, July 1969;

5 List of patent specifications available in ATIRA library, July 1969;

6 List of translations available in ATIRA library, July 1969;

7 List of back volumes of periodicals available in ATIRA library, July 1970.

63 ATIRA Publications

Useful information derived from the work done in ATIRA is disseminated through various publications to mill technologists. Distribution of ATIRA publications and enquiries regarding them are handled by the library. The following is a list of the different kinds of publications, excluding survey reports to individual mills, distributed to member mills.

SN	Kind of publication	N (Till March 1970)
1	Proceedings of symposia and conferences	35
2	Research note	68
3	Circular report	53
4	Survey report	41
5	Case study	14
6	Technical leaflet	31
7	Technical digest	12
8	Monograph	5
9	Book	1
10	Newsletter	86
11	Annual report	22
12	Other	25

In 1966 a comprehensive list of the ATIRA publications was published. This increased their sale.

7 MANAGEMENT

71 Library Staff

The library has the following staff:

Librarian ... 1

Library assistant	...	1
Typist-cum-clerk	...	2
Peon	...	1

72 Finance

The following table gives data about ATIRA's library expenditure:

Year	Recurring Expenditure of ATIRA	Library Expenditure			$\frac{(c+d+e)100}{b}$
		Salary	Periodicals	Books	
(a)	(b)	(c)	(d)	(e)	(f)
1949-50	93,678	-	3,087	9,241	-
1959-60	998,993	-	22,648	26,232	-
1967-68	2,150,991	22,848	30,385	17,307	3.3
1968-69	2,343,600	24,156	44,880	17,977	3.7
1969-70	2,336,176	25,224	45,626	28,882	4.3

8 ACKNOWLEDGMENT

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DRTC Seminar (8)(1970). Paper CM.

INFORMATION SERVICE BY AN INDUSTRY-ORIENTED RESEARCH ORGANISATION: A CASE STUDY.

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An industry-oriented research institute such as the Central Leather Research Institute (CLRI), Madras, can serve as an information and documentation centre for the leather and allied industries. Trends in the Indian leather industry are mentioned. The objectives, the pattern of flow of information and its role in planning the activities of CLRI, the lines of liaison between the leather industry and CLRI and the different channels of dissemination of information and documentation service provided by CLRI to the leather industry are discussed. The proposed plan for improving the service is outlined.

1 RESEARCH AND INDUSTRY IN INDIA

11 Increasing Mutual Impact

India today has a large network of research organisations devoted to the development of indigenous know-how with a view to accelerating industrial production and economic growth and thereby lessening her dependence on imports of materials and know-how. A recent survey has listed 1,374 organisations with Research and Development (= R & D) activity in some measure or other (2). Currently there is intense interest on the impact of such activity on the industries and the extent to which the investment in them has been justified in terms of decreasing our dependence on foreign expertise. The increase in expenditure on industrial research in relation to the total investment on scientific and industrial research and the industrial growth as reflected in the outlay on industry during the different plan periods is given in the table in the Appendix to this paper (See Sec 92).

111 CSIR Research Centres

In 1950-51 there were only 7 national laboratories in the CSIR complex, while today there are 30 such laboratories employing nearly 11,270 scientific and technical workers of different categories (1).

12 Need for Documentation Service

There is thus evidence of an increasing degree of entrepreneurship and a large accumulation of Indian know-how. This knowledge has to be effectively channelised to those who can exploit it. The necessity to gear documentation service to the growing demands of entrepreneurship has been realised only in recent years. The need for efficient documentation service to keep scientists and technologists abreast of the latest developments in their respective fields of interest has been felt only in the last decade in the national laboratories, research centres and a few industries. The emphasis has to be on establishing channels of communication with the user-industries, for creating an awareness of the new techniques, processes and products being developed within the country and abroad, and about the potential for their exploitation.

13 Information for the Leather Industry

The research of the CSIR complex being oriented to a variety of industries, it may not therefore find an omnibus information centre such as the INSDOC, as adequate. Realising this, INSDOC has been attempting to develop individual research institutions as information centres for specific industries. Some of the industrial units, such as CIBA, Hindustan Levers, and ICI (India), and the cooperative research organisations, -- such as ATIRA and SITRA -- have their own information centre. But there are industries who do not come within the range and scope of any of the above. The Leather Industry is an example. In this case, the research institute -- Central Leather Research Institute (CLRI) -- becomes almost the only information centre to serve the industry.

2 INDIAN LEATHER INDUSTRY

The Indian leather industry has an estimated annual output of over Rs 1,200 million. It is largely an export-oriented industry. Its foreign exchange earnings in 1968-69 was about Rs 860 millions, constituting nearly 6.5 percent of the total Rs 13,150 millions earned by the country. The exports comprise of (1) Unprocessed items -- raw and pickled skins, and (2) Items to be processed further -- E I tanned leather and chrome tanned leather in blue; and (3) Processed items -- finished leather, leather footwear and components, leather travel goods, harness and saddlery items, leather apparel and industrial leather products. The largest share is claimed by processed items. The performance targets fixed for 1973-74 envisage elimination of (1) and increase in (3). The industry exists in the organised, small and village scale levels, the export contribution arising mostly from the first two categories. Till recently it has been largely a craft, leaning heavily on human labour. It is now becoming mechanised to an increasing extent. The village scale level, till now contributing largely to local consumption of leather, is now expected to have a share in the exports also. These changes would create a need for know-how relating to processes, processing materials, and for qualified personnel. Unlike in the industrially developed countries, the Indian leather industry is not backed by highly developed chemical and engineering industries capable of supplying all the auxiliaries needed by it.

3 CENTRAL LEATHER RESEARCH INSTITUTE

The objectives of the Central Leather Research Institute (CLRI) are:

1 To facilitate change of the age-old leather industry from a craft-based one to a science-based one;

2 To tackle, through science and efficient

management, the industry's economic, social and human problems.

To achieve these goals, the CLRI

1 Carries out fundamental and applied research;

2 Develops know-how;

3 Carries out demonstrations of the application of scientific and technical knowledge;

4 Disseminate knowledge at all levels of the industry; and

5 Trains technical personnel.

From the point of view of national development, import substitution, export promotion and meeting defence needs are important considerations in planning the Institute's activities.

31 Role of Information

It has been estimated that CLRI has been instrumental in effecting import substitution to the extent of about Rs 20 million, and export promotion to the extent of Rs 900 million. By its activities, the Institute has contributed 51 per cent of the recurring expenditure incurred so far from its inception. All this has been possible mainly because of effective two-way information flow between it and the industry.

In close liaison with its clientele, the institute draws up its annual programme of activities, carries out this programme and disseminates the information thus generated to the appropriate user.

4 LIAISON WITH INDUSTRY

An awareness of the problems of and technological gaps in, the leather industry is the basis of the activities of CLRI. Over the years, the Institute has built up a close liaison with the industry as also with the institutions and organisations connected with the industry. The inflow of information needed for planning the activities of the Institute is effected through several channels. These include:

1 The five regional extension centres of CLRI at Bombay, Rajkot, Jullundur, Kanpur and Calcutta with their scientific and technological staff acting as feeder services vis-a-vis the problems of the industry in the particular region.

2 The periodic techno-economic surveys carried out by the Institute personnel is another means of its becoming aware of the problems of the industry.

3 CLRI receives and handles numerous enquiries relating to various aspects of leather science, leather technology, leather industry and leather trade. The enquiries range from requests for casual information and data to supplying turn-key jobs for establishing tanneries or factories for production of leather auxiliaries. The enquiries represent a cross-section of the Industry's needs and problems.

4 The various demands for technical aid made on CLRI by the industrial units all over the country, within or outside the scope of the Retainer Scheme formulated by the Institute, the consultancy services

rendered by the Institute and the Guest Tanner Scheme whereby an enterprising tanner is given an opportunity to iron out the problems faced, are also means for feeling the pulse of the industry.

5 CLRI invites members of the trade and industry as also scientists and technologists to address the CLRI staff, at the weekly seminars. The suggestions and proposals made therein are duly considered while planning the activities.

6 The annual Get-Together of tanners, leather traders, representatives of organisations connected with the leather industry, scientists and technologists from India and abroad serves inter alia as a forum for presenting, and discussing the programme of activities of CLRI for the coming year.

7 Leather being an international commodity and also a major item of export from India, the activities of CLRI have to be planned in a global context, with due reference to similar problems faced and work being done elsewhere. International Conferences, such as the Biennial Congress of the International Union of Leather Chemists and the Informal Club of the heads of the leather research institutes the world over, provide an effective means of minimising the duplications of research in the field and coordinating research at an international level.

The international assignments given to the Director and other staff of CLRI serve to bring to light the problems in developing countries.

8 CLRI is represented on all the bodies concerned with leather and allied industries and also on the national policy-making groups. This makes it possible to evolve an integrated plan of activities fully geared to the plans for national development.

9 The advisory committees for the different areas of CLRI activities consisting of specialists provide the correct orientation to the plans drawn up.

10 The Executive Council of CLRI composed of distinguished representatives of the industry, trade, government and organisations working for the industry is the authority for the final approval of the plan of activities.

The information flowing in through the various channels mentioned above will be both in document and non-document forms. The utility of the information thus obtained goes beyond the stage of planning of CLRI activities. The documents containing the information has to be collected and searched when necessary for disseminating information to the industry.

5 FLOW OF INFORMATION WITHIN CLRI

51 Documentation List

The carrying out of the activities of CLRI requires proper flow of information within the organisation. The R & D projects require:

1 Information about what has already been done in order to determine the actual take-off stage; and

2 Information on methods, processes, and materials and the theoretical base for them.

The documents of the library and information sources in other sections are utilised. As part of the information service to the research workers, CLRI produces the following:

1 Leather titles service - a trimonthly advance documentation list based on the scanning of documents received in the library, with reference to the activities of CLRI; and

2 Current leather literature - a monthly abstracting service.

52 Record of Work in CLRI

The primary record of what has been accomplished is the quarterly report of the R & D workers, cumulated into half-yearly and annual reports. The latter provide the necessary feedback to the Executive Council. The information in the reports either finds an outlet in various forms regularly or is utilised as and when required. For the latter purpose it has to be well documented.

6 DISSEMINATION OF INFORMATION TO THE INDUSTRY

CLRI disseminates information to the industry in various ways. Some services are provided in anticipation of demand. Others are provided on demand.

61 Anticipatory Service

611 Conference

The weekly seminar, the symposia organised in India and the international conferences constitute one kind of media for the presentation of results of research done in CLRI. The information presented in this way may ultimately be embodied in articles in periodicals and in monographs. The published documents are of different kinds:

1 Research papers - full length and short communications - published in the Leather science, (CLRI), and in other learned periodicals;

2 Papers on processes incorporating the know-how for the industry, published in Leather science, Thol vigyanam (Tamil), Charma vigyan (Marathi and Hindi), all published by CLRI, and in other periodicals. These papers are brought out from time to time cumulatively as Process bulletins;

3 Patents covering the potentially utilisable developments relating to leather auxiliaries, processes in leather making, and utilisation of products. The patents are handled by the National Research Development Corporation. CLRI supplies the non-technical notes;

4 National Standards and Specifications formulated in collaboration with the Indian Standards Institution;

5 Reports of techno-economic surveys conducted

within the scope of the annual programme of activities of CLRI; and

6 Publicity folders, handouts and newspaper articles.

62 On-Demand Service

621 Consultancy Services and Special Assignment

The Institute has come to be looked upon as a competent industrial consultant having the necessary experts and expertise. The demands made at both the national and international levels mainly relate to production units, such as for

1 Setting up a tannery or leather auxiliary, footwear or leather goods in a particular region of India or in a developing country, often involving turnkey jobs;

2 Reorganising and rationalising the functioning of "sick" production units;

3 Drawing up feasibility reports and blueprints for developing leather and allied industries in different regions of the country;

4 Assignment as expert deputed by world bodies such as FAO, UNIDO, and UNDP, for developing leather and allied industries in developing countries; and

5 Carrying out trade and market surveys for assessing export potential for leather, its products, and bye-products.

Such services cannot entirely be based on published sources of information. Actual surveys, on the spot studies and data collection are important phases of these services. The information generated, may, in its final form, be a document not of the conventional type, which would quite possibly be the basis or model for other similar situations. This information needs to be documented.

622 Technical Service

CLRI has a pilot tannery offering common service facilities and tannery scale trials and testing laboratories for giving analytical and test reports. The information thus generated and supplied to the clientele has a storage and search significance in the context of quality control and formulation of standards.

623 Technical Enquiry

Technical enquiry may be of the following kinds:

1 Request for addresses of suppliers and manufactures in the field of leather and leather auxiliaries;

2 Solution for some process difficulty encountered in the manufacture of leather and leather auxiliaries;

3 Know-how for the manufacture of special types of leather, to meet special requirements of customer and technical auxiliaries;

4 Request for library service -- publications

of CLRI, reprints, photocopies, translation, adhoc bibliographies and the like; and

5 Selection of suitable personnel.

Information supplied in response to the above kinds of queries may be available from conventional bibliographical tools and trade documents in the case of (1) and (4), and derived from accumulated information or that worked out specifically through the expertise available at CLRI in the case of (2) and (3).

624 Practical Demonstration

Practical demonstrations are held by the CLRI staff of the base or of the extension units, at suitable centres. They are tailored to the local needs and availability of raw materials and processing facility. Follow up service after the demonstration is also available. The demonstrations may be open or closed. Frequently the know how in the open demonstrations is published as process papers.

7 ORGANISATION

71 Documents

The conventional sources of information for Anticipatory Service are amenable to the well tried methods of organisation and arrangements modified to suit the local exigencies. But the information in need for the On-Demand Service is of the non-conventional type. The information disseminated has something more than a current utility and has to be made available for recall.

72 Consultancy Service Report

The activities under Consultancy Service and special assignments when completed often result in reports containing the neessary suggestions, recommendations, and plans. Some may be of a confidential nature and are not available for dissemination. However, all the reports are to be classified and catalogued and stored with the other reports. It may be not so much the actual information contained therein as the methodology that is required for reapplication.

73 Data from Technical Survey

The data collected in technical surveys are also to be well indexed to facilitate their effective use.

74 Answer to Technical Enquiry

The answers to the technical enquiries are currently being filed broadly according to the subjects of CLRI activities -- for example, raw hides and skins and related bye-products; collagen; tanning and finishing processes; footwear and leather goods; leather trades engineering; and leather economics. Before an enquiry is answered, a check is made for availability of information. Efforts are being made to have an improved classified arrangement of the documents with an alphabetical index of the parties seeking information and the subjects covered.

75 Research Programme

Research programmes and research data are obtained from leading centres of leather research on an exchange basis. This advance information for restricted circulation is received by virtue of the special status enjoyed by CLRI in the world of leather research. It is planned to keep the information so received in loose leaf folders and indexed by problems undertaken for research and solutions obtained and by the organisations. Information of interest from sister laboratories is also being handled similarly.

The following system is envisaged as regards the research programme of CLRI.

Each programme is indexed according to the problems, objectives and the research woekers concerned. The problems are broadly classified according to the research areas of CLRI and are correlated to the information on the progress reported in the periodical progress reports.

It is proposed to have an integrated system for getting all the details inclusive of the problem undertaken, the progress made each quarter, the personnel involved, the capital and recurring investments made, the papers and other publications resulting out of these efforts, the patents resulting from it and the extent to which the industry has been benefitted. The entire system is under review. The main purpose of this is to minimise duplication of research within and outside the Institute and to ensure greater coordination with emphasis on the economic and industrial benefits.

8 CONCLUSION

1 There is an urgent need for understanding the types of information required by the industry and developing the techniques for processing and disseminating it in the form required.

2 Information emanating from discussions, informal seminars, official correspondence, non-published technical reports etc, is important.

3 The close cooperation and participation of the technologists in the documentation service of a research organisation can produce greater efficiency in the service.

4 Special techniques for the processing, storage and dissemination of information of relevance to industry should be developed.

5 A centralised organisation, such as the INSDOC should ensure the quick dissemination of information about patents and special reports containing industrial information of relevance to each R & D centre.

91 BIBLIOGRAPHICAL REFERENCES

1 Sec 112 RAJAGOPALAN (T S) and SATYANARAYANA (R). Directory of scientific research institutions in India. 1969.

2 Sec 11 SCIENTIFIC AND INDUSTRIAL RESEARCH (Council of -). 25 years of CSIR. 1968.

Table 1. R and D Expenditure

Figures in 000,000s

Plan/Period	Total outlay	Outlay on Industry	(3) as % of (2)	Scientific and Industrial Research	CSIR Expenditure
(1)	(2)	(3)	(4)	(5)	(6)
I Plan (1951-56)	41,770	1,880	4.5		
II Plan (1956-61)	72,00	7,700	10.7	720.00	
III Plan (1961-66)	116,000	25,700	22.1	1444.90	583.8
IV Plan (1969-74)	248,820	53,380	21.5	3385.80	1211.2

Source of information:

1 Economics Year Book

2 Commerce, 120, 3081;1970 May 23; ix

3 INDIA, PLANNING(—Commission). Fourth five year plan, 1967-74. P 381-3.

DRTC Seminar (8)(1970). Paper CN.

NATURE OF QUERIES IN AN INDUSTRIAL LIBRARY: CASE STUDY.

P PRATAPLINGAM, Hindustan Machine Tools Limited, Hyderabad 37.

Attributes of queries arising in an industry are enumerated. The helpfulness of formal and informal contacts with the reader in providing efficient reference service is emphasised. Two case studies of reference service rendered in machine tool industry are presented. The helpfulness of reader-librarian dialogue in specifying the subject of the reader's query and the need that may arise at times to go beyond published documents to subject specialists in the search for the information required are highlighted.

1 ATTRIBUTES OF QUERY

Queries arising in an industry may

1 Cover a wide range of subject-fields -- scientific, technological, commercial, and managerial;

2 Require an answer quickly or at least with a minimum of delay;

3 Range in extension from that of a broad subject to that of a very narrow specific topic.

2 SOURCE OF INFORMATION

The answer to a query may have to be obtained from

1 A document -- such as, book, periodical, patent, specification, standard, data sheet and drawing. (Some of the documents may be generated within the organisation, while others may have to be procured from external sources); or

2 Other institutions specialising in the subject of the query; or

3 A specialist in the subject either within the organisation or elsewhere.

3 EXPRESSION OF QUERY

The expression of a query by a specialist may not be coextensive, in the first instance, with the subject he may be interested in at the moment. Sometimes, the statement by the reader may appear to be specific but later on may turn out not to be so. In any case, facet analysis of the query, and a well planned trilogue between the reader, librarian, and library tools are helpful in bringing out the missing links and in precise specification of the subject of the query. This is essential to make the answer to the query pinpointed and comprehensive.

4 CONTACT WITH READER

A continuously updated knowledge of the subject(s) of interest of each reader, through formal and informal contacts with them will be of help in several ways;

1 As background information for the efficient

facet analysis of subject of query in the appropriate context;

2 In conducting the dialogue with the reader in a helpful way in the specification of the query; and

3 Developing reader profile records for making the reference and documentation services pinpointed and exhaustive.

5 RECORD OF REFERENCE SERVICE

The helpfulness of maintaining a detailed record of reference service rendered is being realised in an increasing measure. Of particular help is the detail of the dialogue between reader and librarian leading to a specification of a query and as a help in finding the answer.

6 CASE STUDY

In the succeeding sections, two case studies of reference service rendered in a company producing machine tools is given to illustrate some of the points mentioned in Sec 1 to 4 above.

61 Case 1: Gear Inspection

L = Librarian R = Reader

R.- Will you please give me the Russian book on gears.

L.- Russian book on gears! Do you, by any chance, remember the name of the author or the title of the book?

[R looked around the shelves in a vain bid to recognize the book. It was obvious that he remembered neither the title nor the name of the author.]

R.- It is a book of this thickness [showing by hand], with a red cover, I think.

L.- Is that book wholly on gears or only a part of it is on gears?

R.- Not the whole book. I think a chapter of it deals with gears.

L.- I see! Could it be Machine elements by Dobrovsky and others.

R.- Yes, I remember it now. Exactly the same book.

[L searched for the book. It was out on circulation. Then L picked up a Reference book on gears -- Gear handbook by Dudley, and approached R].

L.- This may help.

R.- I don't want that book. I have already seen through it. The information I need is not there.

L.- This is a reference book. It gives fairly complete information about gears. Anyhow, may I know what is it you are looking for in that Russian book?

R.- I want to know something about inspection of internal gears.

L.- What type of gears: helical, spur ... ?

R.- Spur gears.

[As the problem was related to "inspection", L thought of referring to the book "Engineering inspection" by Parkinson. However, that book too was in circulation.]

L.- Mr R, do you want information about any specific method of inspection, such as 'PCD' (Pitch Circle Diameter) or 'Surface Finish' Method?

[Then, R tried to come out with his specific problem.]

R.- I am interested in the 'PCD' method. But I also want to know about other methods, so that I can make use of them in relation to the instruments we have in our 'Inspection Room'. Well, at the moment, I have a formula to be used in the process of inspection but I am unable to understand some items of the formula through which I want to know how the formula is derived.

[Thus, after drawing different relevant facets of the problem from R, the picture was getting clearer; R had a formula on spur gears, but couldn't use it because he couldn't understand some of the elements in the formula. The problem was half solved, for L had only to search for a presentation of the formula in which the items are explained in a way understandable to R. L thought of the handbooks giving such formulae. He picked out the Engineering tables of the American Society of Mechanical Engineers.

R was shown various formulae on gears given in it. R almost snatched the book from L and went through it avidly. After some time he came to L.7

R.- This gives details regarding certain factors in the formula but there are some more factors which are not clear.

/This statement puzzled L, for the Gear handbook and 'ASME Engineering tables were the two books he expected to solve the problem. He felt that some link was missing in the dialogue with R.7

L.- Mr R, I feel we should consult the Gear handbook once again.

R.- Not necessary at all. You see, that book deals with the subject in FPS system, but I want the data in 'Metric' system.

/L could now spot the missing link. L thought over for a few minutes in recalling other pertinent documents on gears. The collection of German standards came to mind. The index of DIN Standards Handbook was checked. A DIN specification on errors in gear teeth system, with definitions was located. There was one on spur gears also. The standard was issued to R.

After fifteen minutes, R with bright smile, came to L for returning the standard.7

R.- I got all the points cleared. I had earlier spent half a day on this. Thank you very much.

62 Case 2: Expansion of an Abbreviation

R (an engineer).- Could you find for me the full expansion of "AFS"?

L.- It should be "American Foundry Society". [R laughed at the reply].

L.- Could you please tell me about the context where this abbreviation occurred?

[L realised that one and the same abbreviation may mean different things in different contexts].

R.- This abbreviation was mentioned on a component drawing sheet of a customer, to whom I was designing a machine to manufacture that component.

[L searched some handbooks and other standards on conventional Drafting Practice in designing but the abbreviation 'AFS' was not found anywhere. But the engineer could not proceed with his design work unless the abbreviation was decoded.

L thought of checking the component drawing itself so that he can understand the problem well and know the exact context where it occurred.]

L.- Mr R, could I see the component drawing sheet? It may throw some light on the problem.

R.- Sure, I shall get it right now.

R went to his section and returned immediately with the blueprint of the component drawing. The blueprint pertained to the details of a 'Transmission Case' of an automobile.

On studying the drawing, the query could be specified in the following way:

"Two holes are located at 200 mm c.d (centre distance) within + 0.02 mm (tolerance). What is the difference if the tolerance specified for the portion of holes is at AFS and RFS, and MMC."

L noted from the blueprint of the drawing that the component was produced by the Ford Motor Co (USA), and therefore thought that the abbreviation may be one used in American drafting practice. Therefore, the "Drafting Standards" published by the Aerospace System Group of North American Rockwell Corporation (Publication No 521-A-3, Rev 1-68) was checked. It is a manual containing policies and procedures on drafting followed there. There was a fairly big list, about 45 pages, of abbreviations with their expansions. 'RFS' was decoded as "Regardless of Feature Size". The abbreviation MMC was already known to be "Maximum Material Condition".

R then reviewed the problem in the light of the clarification of these points and tried to find out the meaning of 'AFS'. Though the problem was clearer with the additional information from the drawing, yet it was not solved. Two points regarding drafting conventions were recalled:

1 Some drafting conventions are different in different countries. These will be found in some national standards of the country concerned, and

in some reference book or other; and

2 Other conventions are used by individual companies and as such those conventions and symbols, may not be found in a reference books or standards.

In view of this L thought that "AFS" might be one of those drafting conventions restricted to a company, and hence it may not be found in any of the published documents.

The only course left for L was to write to the Ford Company, but the information needed was urgent. So L took R to one of the Senior Design Engineers and the problem was explained to him. Based on the context of the problem, he could decode "AFS" as "Allowable Feature Size".

Thus, at times, when we fail to dig out information from documents, experts in the field may help.

DRTC Seminar (8)(1970). Paper CP.

ROLE OF REFERENCE SERVICE IN CONVERTING SCIENTIFIC KNOWLEDGE INTO USEFUL TECHNOLOGY: A CASE STUDY.

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Reference service in an industry involves skilful and persistent exploring, analysing, and synthesising available information and harnessing research potential, when needed, to solve the problem involved. A case study illustrating this is presented. The various stages of the reference service, and the establishment of a symbiosis between a research institution and the design department of an industry in converting scientific knowledge into useful technology, are discussed. Efficient reference service can produce benefit to the industry as well as help to generate new technology in the field.

1 INTRODUCTION

One of the services given by the Central Technical Information Centre (CTIC) of the Hindustan Machine Tools (HMT), Bangalore, to its clientele is long range reference service. At times, a long range reference service leads to the establishment of liaison between HMT and academic and research institutions. One such case which helped in establishing liaison between the Design Department of HMT and the Mechanical Engineering Department of the Indian Institute of Technology, Kanpur, is described in this paper.

2 THE PROBLEM

The elimination of back lash between the nut and the screw to ensure accurate feed movement, was the problem posed to the design engineer. In one of the HMT Units, outside Bangalore, a method of eliminating the back lash, based on the use of the face gear, was attempted. The principle employed consisted in designing the face gear to have a rolling motion when engaged with the nut. Our designers were confronted with the problem of specifying the parameters for the face gears. As they could not get the necessary information in the Unit's library, the problem was referred to the Chief Engineer-Designs (CED), HMT, Bangalore. The CED, in turn, discussed the matter with the Documentation Officer (DO). The related drawings and letter were given to the DO. The relevant documents were to be selected from the library.

3/4 STAGES IN FINDING SOLUTION TO THE PROBLEM

3 DOCUMENTS AND EXPERTS

31 Scanning Documents

Keeping the problem in view, and analysing the query, the documents available in the CTIC were scanned and the relevant documents given to the CED. The CED, after carefully going through all the documents, requested for one of them: Design principles of metal cutting machine tools by Koenigsberger. After a perusal of the document, the CFD felt that the information contained in it would not help in solving the problem completely. In the meantime, the DO got some more information on the problem.

32 Approach to Academic and Research Institutions

Attempts were made to contact the academic and research institutions engaged in research in machine tool engineering and allied subjects. In the absence of any national register giving details of the research being carried out in different institutions in the country, the mechanical engineering department of the following institutions were contacted: Indian Institute of Technology in Madras, Bombay, Delhi, and Karaghpur, and the Indian Institute of Science, Bangalore. Prof F Koenigsberger of the Machine Tool Engineering Division of the University of Manchester, Institute of Science and Technology, was also contacted.

4 RESPONSE

41 Indian Institute of Science, Bangalore

In response to our query, the Professor in charge of the Mechanical Engineering Department of the Indian Institute of Science, Bangalore, furnished the following references on face gears:

1 FRANCIS (Victor) and SILVAGI (Joseph). Face gear, design factors. (In Chironis (N P), Ed. Gear design and application. 1967. P 87).

2 DUDLEY (D W). Gear handbook. Sec 4-46, 5-71)

3 BUCKINGHAM (E). Analytical machanics of gears. P 312-20.

The documents mentioned at 2 and 3 were available in the CTIC. They were given to the CED, in the first instance, along with the other references. The document by Francis and Silvagi was obtained from the Indian Institute of Science and shown to CED. An extract of the relevant sections was made.

42 Prof Koenigsberger

Prof Koenigsberger of Manchester very kindly sent us some information on the design of face gears.

43 Indian Institute of Technology, Kanpur

The Assistant Professor of the Department of Mechanical Engineering, IIT, Kanpur, provided us with some information and offered to send more on the general procedure for the design of face gears.

43 Indian Institute of Technology, Madras

The Assistant Professor of Metrology Laboratory, Department of Mechanical Engineering, IIT, Madras, furnished photostat copies of relevant pages from the Spanabhebende Werkzeugmachies Fur Die

Wortschaftliche Fertigung, Teil 4, Frasmaschine-man, Published by Fachverlag Schiele and Schon GMBH, Berlin. This German document was translated into English by our Technical Translator. A copy of the photostat of the original document along with the English version of the article was sent to the Manager, Designs of the HMT, Pinjore Unit, who had asked for information regarding problem.

5 LIAISON WITH IIT, KANPUR

51 A Problem for Research

The Dean, Research and Development, IIT, Kanpur, subsequently wrote a letter to the General Manager, HMT, Bangalore, enclosing a copy to the DO, stating that the Mechanical Engineering Department of IIT and the DO of HMT had been in correspondence for some time regarding information on the design of face gears using backlash eliminator of milling machines. He further stated that the Assistant Professor in IIT had evinced keen interest in the problem and had entrusted the work to one of the post-graduate students who was specialising in gears. The Dean expressed the desire that the Assistant Professor and the Post-graduate student may be given facility to visit HMT to verify whether the models developed by them were satisfactory for making a few gears at our factory. The Dean was very optimistic of their technical know-how on the production of gears. The DO discussed the matter with the General Manager and CED and, since Kanpur was nearer to our Pinjore Unit, a copy of the letter was sent to the Manager, Designs, HMT, Pinjore. The DO wrote to the Dean, Research and Development, IIT, Kanpur, appreciating his interest in the design problem and informing that the Pinjore Unit would take necessary action in the matter.

The Design Manager of HMT, Pinjore Unit, apprised the Assistant Professor of IIT, Kanpur, about the difficulties encountered in designing the face gear. Even as they were trying to establish rapport, the Design Manager of Pinjore HMT Unit came over to Bangalore as Chief, Design and Development.

52 Facility for Experimentation

The following is an extract from the letter of Assistant Professor, IIT, Kanpur to the DO:

> "Mr Bhadoria has found out design parameters for on-line and offset face gears from theoretical point of view and his results agree with the findings of Prof E Buckingham (Ref: Analytical Mechanics of Gears) and those of V Francis and J Silvagi (Ref: Page 87, Gear Design and Applications, edited by N P Chironis, 1967). Mr Bhadoria approached the problem from a purely kinematic aspect whereas the approach of Prof Buckingham was geometric and that of Mr Francis was experimental.
>
> In order to verify his theoretical findings experimentally, Mr Bhadoria intends to generate a few sets of face

> gears. For better visualisation the material will be perspex. The gear will be made here.
>
> As we do not have any gear generator here, we could not finalise the design of a fixture to hold the axis of the gear blank at right angles to that of the cutter. Once Mr Bhadoria is at HMT, Bangalore, he can design and fabricate one such fixture and complete his experiments.
>
> We would be grateful to you if this facility is extended to our student."

The DO discussed the matter with the Chief Design and Development and the Assistant Professor was requested to send the designs and drawings for study by our engineers so that the required facility may be provided to the post-graduate research student, Mr Bhadoria, at HMT, Bangalore. Subsequently, Mr Bhadoria cut a few face gears in our factory. He is now back in Kanpur and we are quite hopeful that the technical know-how which we would get as a result of this project would be very vital and useful to solve the problem.

6 SYMBIOSIS

This contact between the Design Department of the HMT and the Mechanical Engineering Department of IIT, Kanpur, has not only proved to be a great help in solving our problem but has provided an interesting topic for research to a post-graduate student, for his thesis. This further paved the way for establishing symbiosis in the development activities of the Mechanical Engineering Department of IIT, Kanpur.

The initiative and persistence of the Central Information Centre helped to sow the seed for cooperative research. The Design Department of HMT immediately took advantage of the research potential of IIT, Kanpur, and invited the Assistant Professor of Mechanical Engineering, an expert in the gear design, to help the design department in the project of computersied design of main drive gear box of lathe by making use of the electronic computer installed in HMT.

This project was of an experimental nature and was carried out in about twenty days. The investigation is reported to be the first of its kind in India. The project is being pursued by the Mechanical Engineering Department of IIT, Kanpur, at the request of HMT. For this purpose, HMT has instituted a Fellowship at IIT, Kanpur. A Junior Design Engineer has been deputed to work in close cooperation with the research fellow.

7 CONCLUSION

The case study is an example of how reference service can be made productive by exploring, analysing, and synthesising the information and research potential available in the country. The Technical Information Centre played a vital role in establishing a liaison and in the conversion of scientific knowledge into useful technology.

8 ACKNOWLEDGEMENT

I am grateful to Prof A Neelameghan for guiding me in the presentation of this paper.

DRTC Seminar (8)(1970). Paper CQ.

PRODUCTIVITY IN BUSINESS AND INDUSTRY IN AN ENVIRONMENT OF ADVANCING TECHNOLOGY: ROLE OF DOCUMENTATION SERVICE.

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Conservation of human resource, particularly intellectual resource, is the first concern of management-in-action. Productivity in converting scientific and technical knowledge into useful commodities and services calls for creating an environment conducive to innovation at all levels of activity in an enterprise. This is closely linked up with the provision of access to information needed at each of these levels. Examples of pay-off, in quantitative terms, by library service helping to introduce new ideas, and of wastage due to non-availability of the information required, are given. The factors -- such as, the atomisation and specialisation to a high degree in industry, the accelerated pace of production of new ideas, the accelerated pace of obsolescence of ideas, and scatter and seepage of subjects -- making documentation a field for specialisation in library service, are mentioned. Management of industries should take advantage of the benefits from efficient documentation service.

1 MANAGEMENT OF HUMAN RESOURCE

11 Normative Principle 1 of Management-in-Action

"Management should conserve human resource" is normative principle 1 of management-in-action. Every management decision and action should be designed to increase the efficiency and productivity in the conservation of human resource. Every method and technique of management should be guided by and deducible from, this first principle.

12 Intellectual Resource

Of all the resources available to the management in an enterprise, human resource is the most valuable and potential power for progress. The intellectual component of human resource is the most precious. It must be carefully conserved, consciously developed, and adequately utilised. And this is almost independent of economic and social conditions.

2 INPUT FOR PROGRESS

Making necessary provision for enriching the innovation potential is a pre-requisite for converting scientific and technical knowledge into useful commodities and services. It is, in fact, an essential input for progress. Providing this input is an important function of management.

Enriching the innovation potential requires:

1 Developing an environment helpful in promoting innovation in the whole chain of industrial activity -- research, development, production, marketing, and post-sales service, feedback and repetition of the cycle;

2 Selecting the appropriate advanced technology;

3 Applying the advanced technology before it becomes obsolescent;

4 Bearing in mind that there may be competitors using similar or even more advanced technology; and

5 Developing a management structure, conducive to maximising the chances of making gainful decisions in planning, organisation, and control at all levels.

3 ROLE OF INFORMATION

31 Flow of Information

Today the manager of an enterprise, particularly in the higher echelons, has to spend over eighty per cent of his working time in receiving, processing, and converting information into gainful decisions, and channelling the result, again in the form of an oral or written instruction, report, etc, to the appropriate points in the enterprise. The creation of an environment supporting this activity is linked up with making available the intellectual resources -- that is, the knowledge developed, either within the organisation or outside it -- to those who can make adequate use of it for further progress. Access to precise and reliable information -- scientific, technological, commercial, and managerial -- at the right time, to the right person in a form most conveniently usable by him, can help to minimise the wastage of resources due to unnecessary and unintended re-invention, rediscovery, re-development, and the making of unfruitful decisions. For, a decision can be no better than the information that the decision-maker has access to. Further, the availability of the right type of information can trigger new directions in research, development, and managerial action.

32 Pay-off from Timely Information

Here are some examples, in quantitative terms, of payoff from timely information.

SN	Saving	Particulars
1	Rs 4,200,000 per annum	USA, Company Library, through circulation of documentation list
2	Rs 1,650,000 per annum	Lithuania, Vilnius Factory for Electric Welding Equipment, Information Department helped to introduce 105 new techniques during 1965
3	Rs 8,000 per annum	Swedish Government Handicrafts Institute provided information about a more efficient machine to a paint manufacturer
4	Rs 100,000	Danish Council on Scientific and Technical Research provided necessary information before starting research on workmen's clothing. Also resulted in bringing a clothing manufacturing industry to Denmark
5	Rs 300,000	India, Bangalore, Machine Tool Industry, Library provided information about the use of a device
6	500 hours of research personnel	USA, New York (New Jersey), Research and development laboratory, Library service

SN	Saving	Particulars
7	Large sum	Canadian company requiring information about a Swiss process arranged for visit to Switzerland of its Vice-President. Time, money, effort saved by the library searching out the needed information from documents available with it
8	Large sum	USA, Costly research programme stopped by the Company Librarian tracking an "unknown" process for nickel-plating aluminium in a German patent
9	Solution to problem	Scotland, Technical Liaison service of the Scottish Council (Development and Industry) helped 109 firms solve 223 problems, the answers being found by a librarian
10	Solution to problem	India, Bangalore, Company Library provided information for streamlining and efficient operation of Stores Department

33 Wastage of Resource from Want of Relevant Information

Here are some examples of unintended duplication of research and developmental effort and consequent wastage of human and material resources due to lack of information when it was needed.

SN	Subject-field	Particulars
1	Scientific research	UK, annual cost of unintended duplication of research due

SN	Subject-field	Particulars
		to the delay in the supply of available information estimated at ₨ 216,000,000.
2	Photometric studies	Scandinavia, Validity of Lambert's Law in relation to a photometer was investigated and then it was discovered that the work had already been done in Germany
3	Electronics	USA, annual cost of duplication of governmental research and developmental activity in electronics field for want of information on the projects in progress estimated at ₨ 15,000,000
4	Frequency multiplier	Scandinavia, the work on the design and development of a frequency multiplier for Frequency Modulated Radiophony was found to be a duplication
5	Optical filter	Scandinavia, eighty hours spent in the calculation of an optical filter when it was found that such calculation had already been done elsewhere and the type of filter was commercially available
6	Electronic translation equipment design and development	USA, industrial laboratory spent 5 years in research and then found that this work had already been done by Russian scientists and that the results were available. Estimated loss: ₨ 18,700,000

SN	Subject-field	Particulars .
7	Ceramics technology	Scandinavia, development of a method for the dispersion of sulphur in ceramic batches after prolonged research, when a compound for the purpose was being marketed by the Imperial Chemical Industries
8	Ceramics technology	Scandinavia, after completion of the work on drying of ceramics by a particular method, it was found to have already been reported from USA
9	Sugar technology	Scandinavia, studies on the drying of lump sugar duplicated
10	Complex builder	Scandinavia, after investigations were carried out and the results were reported, it turned out that similar work had already been done in USA
11	Composition of cork	Scandinavia, after research was done for some time, an identical study carried out in Spain became known through reprints of relevant papers received from the investigator in Spain
12	Casting process	Scandinavia , . after development of a casting process with considerable expenditure, it was found out that the process had already been patented

SN	Subject-field	Particulars
13	Weapons and missile systems	US, Department of Defence Survey indicated that 92 per cent of the information needed for the development of advanced weapons and missiles systems since the Second World War, had been already available for some thirty years. Much of this information was not made available when needed and therefore, a considerable amount of work during the postwar period was actually duplication
14	Engineering and technology	Sweden, a survey conducted about ten years ago indicated that even a large enterprise produced only two per cent of the information necessary for the manufacture of its new products. As the remaining 98 per cent of information originating outside the company is not often brought to the notice and use of the appropriate persons in the company at the right time, the chances of duplication were quite appreciable

34 Pointers from Surveys

341 Facilitating Information Flow

One survey of industries has indicated that the following kinds of information facility, operating collaboratively, help the flow of information in the organisation and enrich the "information environment":

1 Documentation facility;

2 Research, development and testing facility;

3 Advisory facility;

4 Educational facility primarily for the documentation and advisory facilities; and

5 A management set up appreciative of and focussing attention on, coordination and monitering technical, marketing, financial, and management information to points in the organisation most likely to exploit it for the progress of the organisation.

342 Attitude to Information Usage

Carter and Williams, surveying technical progressiveness of British firms, vis-a-vis their financial success, developed a checklist of twenty-four characteristics distinguishing a successful firm. Of these, the attitude of the management of a firm towards acquisition and utilisation of knowledge is given weightage. In fact, six of the characteristics are concerned with this attribute.

343 Differentiating Attribute

A group of experts attributed the difference in the growth of technology-based industry in Boston and Philadelphia primarily to superiority of communication -- scientific and technical -- between entrepreneurs and universities, and financial between entrepreneurs and banks.

344 Keeping in the Forefront

A firm in the chemical industry has been spending three per cent of its turnover on research for some twenty-five years without achieving any breakthrough. Yet the firm has been financially successful and placed in the vanguard of the industry. This has been possible because the investment in information service enabled the management and its employees to be constantly aware of new technological possibilities, and improved processes and methods. Thus, with its fingers on current developments --- technical and commercial -- the world over, the firm could, by licence, purchase, adaptation, or other means, put the latest ideas into productive use.

4 PROBLEMS

41 Context

In considering the problems of providing pinpointed, exhaustive, and expeditious access to information, the general technological, industrial, and economic environment has to be borne in mind. This picture may be briefly discribed as follows:

1 A continuously increasing investment in research, development and production facilities as a means to meet the imbalance in and inadequacy of, the availability of the basic necessities of life -- food, shelter, clothing and transport -- caused by

the population explosion in many parts of the world;

2 The organisation of research and development on more productive lines -- solo-research giving place to team-research and research-in-parallel giving place to research-in-series; and

3 Atomisation of production of commodities and services, leading to specialisation to a very high degree.

These environmental factors have led to certain problems of access to information.

42 Downpour of Information

421 Spending on R and D

In the developed countries as well as developing countries, the spending on research and development (R and D) is increasing. Here are some data as examples.

422 Government Spending on R and D

SN	Country	Spending in million Rs (approx)		
		1966	1968	1970(est)
1	U K	10,125	12,000	
2	W Germany	4,365	6,000	
3	Japan	2,200		8,100
4	India		1,057	1,200

423 US Expenditure on R and D by Sector

(in million dollars)

Year	Total	Federal Government	Industry	Univ and Colleges	Federal res contract centres	Other non-profit orgnis
1959	12,520	1,640	9,620	680	340	240
1960	13,710	1,730	10,510	830	360	280
1961	14,500	1,870	10,910	970	410	340
1962	15,610	2,100	11,460	1,140	470	440
1963	17,350	2,280	12,630	1,360	530	550
1964	19,180	2,840	13,510	1,590	630	610
1965	20,550	3,100	14,200	1,900	650	700
1966	22,450	3,300	15,500	2,200	700	750
1967	24,030	3,460	16,650	2,400	720	800
1968	25,050	3,500	17,300	2,600	750	900

In 1920 the total US expenditure on R and D was 0.1 per cent of the Gross National Product (=GNP); it rose to 0.5 per cent in 1940; at present it is about 3.5 per cent.

424 Increase in the Number of Research Personnel

Corresponding to the increased investment in R and D there has been an increase in the number of research and development personnel. Here are some data as examples:

SN	Year	U S A	Japan	India
1	1956		41,000	
2	1962	2,500,000		80,000
3	1965		130,000	
4	1970	4,000,000		120,000

425 USA Manpower in Science and Technology as percentage of Labour Force

Year	Percentage
1940	1.5
1950	2.2
1960	3.2
1970(est)	4.7

43 Accelerated Production of Ideas and Articles

The increased investment in R and D and the increase in the number of scientists and technologists has brought about an accelerated output of ideas. There has also been an appreciable increase in the number of articles in periodicals. Here are some data as examples:

431 Major New Ideas During Different Periods

Colon Class Number	Main Subject	Number of major new ideas and subjects created during		
		1451-1700 (250 y)	1701-1900 (200 y)	1901-50 (50 y)
B	Mathematics	9	24	21
C	Physics	3	21	68
D	Engineering	1	23	46
E	Chemistry	0	36	80
F	Technology	0	21	70
G	Biology	2	4	8
H	Geology	1	16	8
I	Botany	1	7	4
J	Agriculture	0	2	2
K	Zoology	0	4	4
L	Medicine	4	21	80
	Total	21	180	391

432 World Output of Scientific and Technical Articles in Periodicals

SN	CC N	Subject	N of articles	
			1960	1970(est)
1	B	Mathematics	15,000	30,000
2	C	Physics	75,000	155,000
3	D	Engineering	155,000	275,000
		Civil	15,000	15,000
		Mechanical	10,000	20,000
		Electrical and Electronic	80,000	150,000
		Acro space	35,000	75,000
		Industrial	15,000	15,000
4	E	Chemistry	150,000	290,000
5	F,b	Metallurgy	35,000	50,000
6	G	Biology	150,000	260,000
7	GZ	Geosciences	91,000	158,000
8	J	Agriculture	150,000	260,000
9	L	Medicine	220,000	390,000
10	S	Psychology	15,000	30,000
11		Other subjects	929,000	1,882,000
		Total	1,985,000	3,780,000

It is now a common experience, for one specialising even only in a very narrow subject-field, that the amount of information being thrown forth as a result of research and development, is far beyond his capacity to keep up with. In the newer subjects, the pace of gowth is much faster. Here is an example from the field of Laser.

Year	N of published papers in a year	Year	N of published papers in a year
1958	1	1963	700
1960	20	1964	1000
1961	100	1965	1200
1962	325	1969	About2000

There is enough knowledge and to spare! The problem is how to channel it to points where it will be used efficiently. Year after year, while each of us may be adding a bit to our store of knowledge, the proportion of what we know to the totality of knowledge available is decreasing year after year. The manager's position is, in a sense, even worse as he has to have quick access to scientific, technological, commercial and managerial information.

44 Scatter and Seepage

Scientific, technical, and commercial information is now published in a wide variety of documents -- book, article in periodicals, conference proceedings, technical report, patent, standard, commodity catalogue, instruction manual, drawings, charts, photographs, etc. This is called 'scatter of information'. Further, many a subject is assuming an interdisciplinary character. As a result, information on a subject is to be found in a large number of documents dominantly dealing with other subjects. This is called 'seepage of information'.

45 Quicker Pace of Exploitation

Thanks to better facility for dissemination of information through a wide variety of media, a new discovery or invention today is applied and exploited much quicker than was possible even a quarter of a century ago. Here are some examples.

451 Reduced Time-lag in Exploitation

SN	Subject	Year of		Time-lag between (c) and (d)
		Discovery or principle	Development of Device or use	
(a)	(b)	(c)	(d)	(e)
1	Internal combustion engine	1710	1892	182
2	Photography	1727	1839	112
3	Aerial flight	1809	1903	94
4	Telephone	1823	1876	53
5	Gamma ray	1896	1939	43
6	Atomic power release	1932	1945	13
7	Transistor	1940	1948	8
8	Laser	1958	1960	2

46 High Rate of Obsolescence

The accelerated exploitation of inventions has also facilitated technological improvements at an increasingly faster rate. And this is causing a high rate of obsolescence of technological ideas and devices. Here are some examples.

461 Efficiency of Internal Combustion Engine

SN	Improvement	Period	Time Interval (years)
1	Savery-Newcomen to Watt	1710 to 1795	85
2	Watt to Cornish	1795 to 1845	50

SN	Improvement	Period	Time Interval (years)
3	Cornish to Triple Expansion	1845 to 1885	40
4	Triple Expansion to Parson's Turbine	1885 to 1920	35
5	Parson's Turbine to High Pressure Turbine	1920 to 1950	30

462 Yield Strength of Steel

SN	Yield Strength/ Density (10^6 in)	Year of use	Time Interval (years)
1	0.1 (USS Holland, HY 30)	1900	..
2	0.2 (HY 50)	1940	40
3	0.3 (HY 80)	1960	20
4	0.6 (HY 150)	1970	10

463 Energy of Secondary Battery

SN	Year	Energy density (whr/lb)	Reactant efficiency ratio (Kr)	Time Interval (years)
1	1930	10	0.10	..
2	1960	20	0.20	30
3	1965	60	0.35	5
4	1970	100		5

464 Operating Energy of Particle Accelerator

SN	Year of initial operation	Particle Accelerator	Energy in MEV units
1	1940	Electrostatic generator	2

CQ464

SN	Year of initial operation	Particle Accelerator	Energy in MEV units
2	1942	Cyclotron	20
3	1945	Betatron	60
4	1948	Electron synchrotron	600
5	1955	Proton synchrotron	10,000
6	1965	Strong focussing synchrotron	50,000

465 Some Computer Characteristics

SN	Year	Technology	Capacity (Bits)	Add time (sec)	Minimum cost in $	
					Bit Core	10,000 instructions
1	1944	Electro-mechanical	10^4-10^5			
2	1946	Electron tube	10^6-10^7			
3	1950	Acoustic delay line	10^7-10^8	240×10^{-6}	2.61	0.10
4	1952	Electrostatic storage CR T	10^8-10^{10}			
5	1955	Ferrite core	10^{11}-10^{12}	115.0×10^{-6}	1.78	0.01
6	1960	Ferrite core, Silicon transistor	10^{13}-10^{14}	4.0×10^{-6}	0.85	0.005
7	1965	CED 6800	10^{14}-10^{15}	0.8×10^{-6}	0.20	0.0005
8	1970		10^{16}-10^{17}	0.8×10^{-9}	0.05	0.0001
9	1975		Over 10^{18}	1.0×10^{-9}	0.005	0.00001

466 High Vacuum Technology

SN	Year	High Vacuum Pump	Limit of Technology
1	1950	High vacuum pump	10^{-12}
2	1965	Oil diffusion	10^{-14}
3		Ion pump	10^{-15}
4		Helium cryopump	10^{-18}
	(Note.- Interplanetary space: 10^{-17})		

467 Laser Technology

Year	New Technology
1958	Laser structure proposed
1960	Ruby laser
1961	Helium-Neon laser
1962	Solid state laser
1963	GaAs laser
	Pulsed laser
	Q Switching
1964	Ion laser
	Coverage of 200 new wavelengths
1965	N_2 - CO_2 high efficiency laser

47 Inadequacy of Self-Service

About a century ago it was possible for a specialist -- whether scientist or manager -- to keep himself abreast of the wave-front of knowledge in his field of specialisation through self-service -- that is, by scanning a selection of documents by himself. At that time the rate of output of new ideas was relatively low

Today the accelerated rate of output of new ideas and the other factors mentioned above make such self-service inadequate. Further, the service by the specialist will not be thorough and exhaustive; there will be leakage. For, exhaustive search for information requires special techniques. Again, each specialist will have to spend much time in this search for information. This is obviously an uneconomical repetition and no management can afford it.

5 MODERN DOCUMENTATION SYSTEM

51 Supporting Service

Finding out a solution to the problem of access to information that can lead to conservation of research, production, and managerial potential -- in short, human resource -- has been entrusted to the library profession. This field of specialisation in library science is called documentation. Documentation, is thus an essential supporting service which can lead to greater efficiency and higher productivity in all other activities of an enterprise.

52 Objective

A modern documentation system

1 Brings to the notice of the specialist -- that is, research worker, design and production engineer, technologist, and manager -- nascent micro ideas;

2 Pin-pointedly -- that is, avoiding any noise or irrelevancy that may occur through an inadequate selection of ideas;

3 Exhaustively -- that is, not missing any idea likely to be of use to the specialist;

4 Giving such service on demand and in anticipation in a manner that facilitates easy and expeditious access and absorption of ideas by the specialist; and

5 Rendering such service and improving upon it continuously in spite of the ever-continuing downpour of information of all kinds in a variety of sources.

6 DEVELOPMENTS IN DOCUMENTATION

61 Techniques and Tools

Over the past half a century and more particularly after the Second World War, documentation techniques and tools are being continuously improved upon to meet the varied and changing documentation requirements of the different kinds of users of information. Methods for intimately understanding such requirements and the individuating particularities of each specialist to be served are being developed. Advance documentation list for use as a current awareness service, abstracting service helpful in the selection of micro documents for reading by the specialist -- research, engineering, production and management personnel -- retrospective bibliographies to provide background information on a project, digest service, trend reports, state-of-art report, data service, and special reports to management, are but a few of the different tools used in documentation service. Acquiring an intimate knowledge of the different sources of information -- information generated internally within an enterprise and that flowing into it from outside --, organising the records of such information in a helpful way, developing necessary tools to select just the information required from these sources expeditiously and economically, presenting the information in a form most conveniently usable by the specialist, and providing physical access to the needed documents wherever they may be available, are all matters within the purview of the documentalist. So too are the arrangements for securing translations of documents in languages in which the user has no proficiency.

62 Rational Basis for Development

The development of the tools and techniques of the librarian received considerable impetus in the latter half of the nineteenth century, thanks to the remarkable contributions of persons such as Melvil Dewey and Charles Ammi Cutter. However, it was not until the early thirtees, when the Five Laws of Library Science were formulated by S R Ranganathan in 1931, that a sound foundation for library service as a whole was laid. Specific normative principles for the different branches of library science, including documentation, could be formulated on the basis of the Five Laws. All this facilitated a guided development of the discipline as a whole and provided a standard against which the efficiency and helpfulness of each and every tool and technique in the field could be checked. This is being realised in an increasing measure the world over.

63 Study of User

Pinpointed service to meet the exact requirement of the user with a minimum of noise and leakage, requires an understanding of the mode of use of information by specialists of different kinds. Studies on the mode of approach to and use of, information by library clientele had begun nearly a century ago. By 1960 over five hundred such studies have been made. But most of the studies were not of a deep kind. It was only during the last decade that statistical methods, operations research, and psychological techniques came to be used to any appreciable extent in such studies. This has helped a better understanding of the pattern of use of information by scientists, technologists, and managers, and of the mode of flow of information in different research and industrial environments. These findings are helpful to fit documentation service to meet more thoroughly the information needs of different kinds of specialists.

64 Electronic Machinery in Document Finding

Another interesting development is the use of electronic machinery, such as computer, in the processing of information and in document finding. During the last fifteen years, experiments have been done, notably in the United States in this area, and some workable computer-based document finding systems have been developed. Although fully automated information systems, dial-for-information systems etc are perhaps a generation off from now, considerable experimental work is being done towards developing such systems. It is being realised in an increasing measure that more attention should be paid to the development of powerful methods for the classification and arrangement of subjects forming the input to any information system in order to get greater benefits from the use of electronic machinery in document finding. In India, particularly in the Documentation Research and Training Centre, Bangalore, significant progress has has been made in this direction and the value of the work has been demonstrated.

7 CONCLUSION

The trend of development in the design of document finding systems is promising. The management of an enterprise can have at its command the means for conservation of human resource and enriching the innovation potential necessary for progress. What is perhaps needed is a change in the attitude of management. A realisation that the changing technological and social context demands its use of all the tested and proved methods of conserving human resources. A realisation that investment in systems for documentation service is an investment to derive maximum benefit from the investment in research, development, and production.

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CLASSIFICATION RESEARCH.

(DRTC Research Cell, report (1970). 1).

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0 INTRODUCTION

This is a technical report of the classification research done by the members of the DRTC Research Cell in 1970. Sec 1 contains a report of the work relating to the structure and development of the Universe of Subjects. Sec 2 and 3 contain a report of the work done in the Idea Plane, and in the Notational Plane respectively. Sec 4 and its sub-divisions give the total number of Basic Subjects, etc in the Colon Classification (= CC), Ed 7, and list the Depth Schedules prepared during the year. Sec 5 highlights the revision work on CC. Sec 6 mentions about the comparative studies in classification.

1 UNIVERSE OF SUBJECTS

11 Growth and Impact on Classification

A dynamic development of the Universe of Subjects is inevitable. It is a result of social pressure. The rapid growth of the Universe of Subjects affects any scheme for classification. An Enumerative Classification scheme could cope up with the developments in the Universe of Subjects till, perhaps, the twentieth century. Now, since the rate of development has increased manifold, the necessity for a Freely Faceted classification scheme, based on a Dynamic Theory of Classification, is felt. Ranganathan has briefly described (17) the successive stages of the development of Colon Classification, to keep pace with the ever-growing Universe of Subjects.

The Laws of Library Science direct that the scheme for classification should conveniently accommodate the developments in the Universe of Subjects, so as to ensure pinpointed, exhaustive, and expeditious service to the majority of readers. Ranganathan's General Theory of Classification with its Normative Principles, Postulates, Canons, and Principles, is helpful in designing and developing a self-perpetuating scheme for classification. How such a scheme can conveniently accommodate the developments in the Universe of Subjects, without disturbing the basic structure of the scheme, is described by Jayarajan (3).

12 Reception of New Subjects

As a result of the turbulent and continuous growth of the Universe of Subjects, new subjects are thrown forth. A new subject can be a Compound Subject going with any of the Basic Subjects, or a non-Main Basic Subject, or a Main Subject, and so on.

The accommodation of any of these poses problems. Gopinath has described (1) the struggle that a classificationist may have to face before finding out the right helpful position for a new subject in a scheme for classification. The period of uncertainty and change may be prolonged if the specialists in the new subjects are not themselves quite clear about the "shape" and coverage of the new field of specialisation. Taking Cybernetics as an example, its successive positions and status in CC are discussed.

13 New Basic Subjects etc

The examination of the changes in a general scheme for classification, necessitated by the developments in the Universe of Subjects, has been suggested (5) as a method of studying such developments over a period of time. The emergence of a number of new Basic Subjects, Partial Comprehensions, and Subject Bundles, during the last decade, as sensed in revising CC Ed 6, in preparing Ed 7, has been reported upon. The significant features of the growth have been highlighted.

14 Formation of Basic Subjects and Isolates in Social Sciences

Ranganathan has described (16) the formation of Basic Subjects and Isolates in Social Sciences, under the following heads:

1 Fission into Main Subjects;

2 Fission of Main Subjects into Non-Main Basic Subjects;

3 Formation of Compound Subjects by Lamination;
4 Formation of Compound Basic Subjects;
5 Formation of Compound Isolates;
6 Formation of Isolates; and
7 Formation of Complex Subjects.

15 Management of Classification

The accommodation of the developments in the Universe of Subjects, in a scheme for classification, implies changes in a scheme for classification. This means implementation of the changes in the scheme for classification, in the libraries using them. The Principle of Osmosis can be helpfully used for this purpose. Jayarajan has further pointed out (4) that in the context of the increasing turbulence of the Universe of Subjects, the process of updating a scheme for classification, and the implementation of these changes in the libraries using them, has to be almost continuous.

16 Comparison of "Subject" and "System"

The general characteristics of a subject as represented in the Generalised Facet Structure based on the General Theory of Classification of Ranganathan, and those of a System as represented in the General Systems Theory developed by Von Bertalanffy, Hall and Fagen, Boulding, Khailov and others, have been compared by Neelameghan (7). The structuring of a subject, modes of formation of subjects, and patterns of growth in the universe of subjects have been considered. The usefulness of recognising the similarity between "subject" and "system" in the study of the structure and development of the Universe of Subjects has been pointed out.

2 IDEA PLANE

21 Compound Isolate

Compound Isolates can be formed in two ways:

1 By combining two or more isolates belonging to one and the same schedule of isolates; and

2 By attaching a Special Component to an Isolate.

The formation of Compound Isolates in the first way, was used in the earlier editions of CC, but in a prematured form. The formation of Compound Isolates in both the ways is now being more fully exploited. (15).

22 Problems in the Use of Special Components

Neelameghan and Gopinath have evaluated (9) the use of Special Components in the Schedule of Common Isolates such as for Space and Language. They have pointed out some problems regarding the present way of using Special Components, such as the violation of a Principle of Helpful Sequence, homonym in Class Number, and unhelpful allocation of sectors to Special Components. The reasons for these problems have been traced and different solutions are suggested.

23 Common Divisions

An examination, by Neelameghan and T Ranganathan

(12), of the isolates constituting the schedules for the classification of subjects going with each of the different Host Subjects for the Production of the different Components of an Aircraft, indicated that many of the isolates have common components in array of order 1, or 2, or later orders. This led to the preparation of a Schedule of Common Divisions for use in "Divide like" device in the design of the schedules of special isolates. This satisfies the Canon of Helpful Sequence, Consistent Sequence, Scheduled Mnemonics, and also the Law of Parsimony. This device is being used in the design of other depth schedules, and also in Ed 7 of CC.

3 NOTATIONAL PLANE

31 Capacity of CC Notation

The releasing of Sectors (S - a) and (S - C) from their earlier use and also the prescription of Empty, Emptying, and Empty-Emptying Digits, has increased the capacity of CC Notation manifold. The findings in the Idea Plane are now being implemented in the Notational Plane more confortably. Ed 7 of CC is taking full advantage of such a versatile notational system.

32 Seminal Mnemonics

The use of Seminal Mnemonics consists in having the same digit or digit-group to denote seminally equivalent ideas, in whatever subject they may occur. This idea has been found helpful in the design of schemes for classification. It was found helpful and practicable to consider that

1 The ancient tradition of associating or denoting particular groups of ideas by particular numerals as a means of securing a helpful sequence among these ideas; and

2 The sequence of the ideas thus obtained as representing the sequence of steps generally occurring in planning and designing a system, in systematic thinking, in scientific method, and in problem-solving.

These points have been examined in some detail with examples from the field of Management of a Quality Control Programme, Postulate-based Method of Classifying, and generalised version of the procedure for problem-solving (8).

4 SCHEDULES CONSTRUCTED

41 Schedule of Basic Subjects, etc

During 1970, the Schedule of Basic Subjects etc has been revised. The new Schedules contain 76 Main Subjects, 20 Partial Comprehensions, and 364 non-Main Basic Subjects (6).

42 Design of Depth Schedules

During 1970, eight depth versions of CC have been designed for the following subjects.

CC Number	Subject	Author(s)
C5;3	*Spectroscopy	H C Revannasiddappa
D8,96B	Air-vehicle wing	A Neelameghan and T Ranganathan
D8,OG6	*Radio receiver	F J Devadason

CC Number	Subject	Author(s)
F8,3	Food technology	A Neelameghan and S V Sangameswaran
LU5	*Public health	Rajni Ahuja
S	*Psychology	M P Sinha
X62	*Banking	H L Amga
XX,D74	Transport economics	A Neelameghan and M A Gopinath

The items marked by an asterisk (*) are designed by the DRTC Trainees (1969-70). They are not yet published. The other schedules have already been published (10,11,13).

5 COLON CLASSIFICATION

51 Methodology for Revision of Ed 6

For the revision of the existing schedules in CC, Ed 6, and for the preparation of Ed 7, the methodology adopted is briefly as follows: Writing out standard entries for documents published during the last three or four years, the information being taken from the British national bibliography and several trade catalogues. This showed the development, if any, of the subjects.

52 Consultation with Experts

The complexities presented by several of the subjects have made it necessary to consult subject experts before finalising the respective schedules.

This is being done for most of the subjects.

53 Present State of Ed 7

The work on Ed 7 of CC is in progress and is expected to be completed within two to three months. Schedules of isolates have been provided for a number of new subjects, and most of the earlier schedules have been developed considerably. In the case of some subjects, thorough changes have been made. Engineering and Economics are examples. The schedule for Library Science has been already published (14) in the hope that some suggestions may be received before finalising it.

6 OTHER SCHEMES

61 Change of Basic Subjects in DC Ed 17

A comparative study of the Basic Subjects in DC Ed 16 and Ed 17, made by Jayarajan (2), showed that out of the 746 reallocations made in DC Ed 17, 140 involve change in Basic Subject. Some of the inappropriate assignments of Basic Subjects are perhaps due to the absence of explicitly stated guiding principles for the development of DC. This paper also highlights the impact of CC on DC.

62 Universal Classification System

Ranganathan and Neelameghan have evaluated (18) the major ideas emerging from the FID/CR Seminar on UDC in a Mechanised Retrieval System (1968). The implications of a Universal Classification System and the use of electronic machinery are examined. A Universal Classification System should be based on a General Theory of Classification. The capacity of UDC for being developed into a Universal Classification System is examined from the angle of intrinsic and adventitious merits of a classification system.

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3 Sec 11 --. Developments in the universe of subjects, changes in systems for document finding, and user's problems: India's contribution to a solution. (Documentation (International Congress of—) (1970)(Buenos Aires)).

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6 Sec 41 --. --. (--. Sec BC92).

7 Sec 16 NEELAMEGHAN (A). Comparison of "subject" with "system". (Annual seminar, (DRTC). 8;1970; Paper BB).

8 Sec 32 --. Seminal mnemonics as a pattern for system analysis. (Lib sc. 7;1970; Paper F).

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10 Sec 42 -- and --. Transport economics: Depth classification version of CC. (Lib sc. 7;1970; Paper N).

11 Sec 42 -- and RANGANATHAN (T). Air vehicle wing production: Depth classification version of CC. (Lib sc. 7;1970; Paper C).

12 Sec 23 -- and --. --. (--. Sec C41).

13 Sec 42 -- and SANGAMESWARAN (S V). Food technology: Depth version of CC. (Lib sc. 7;1970; Paper L).

14 Sec 53 RANGANATHAN (S R). Colon classification for library science. (Lib sc. 7;1970; Paper J).

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CATALOGUING RESEARCH.

(DRTC Research Cell, report (1970). 2).

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0 INTRODUCTION

This is a technical report of the research in cataloguing done by the members of the DRTC Research Cell in 1970. The following are the specific areas in which research has been carried out:

1 Foundation of the Canon of Recall Value;

2 Conflict among the Canon of Recall Value, the Canon of Prepotence, and the Canon of Ascertainability;

3 Implication of the Canon of Recall Value;

4 Rules for rendering a multiworded name formulated on the basis of the Canon of Recall Value;

5 Change in the library catalogue;

6 Readers' reaction to rendering of names according to the rules formulated on the basis of the Canon of Recall Value;

7 Critical and comparative study of the different editions of CCC and AACR; and

8 Postulate-based subject profile for reader.

1 FOUNDATION OF THE CANON OF RECALL VALUE

An investigation about the foundation of the Canon of Recall Value revealed that the effficiency of the catalogue's response to the approach of a reader is to be considered primarily in relation to the capacity of his memory in recalling a name encountered by him at least once. The factors that detract a normal reader from recalling all the words in their sequence in the multiworded name of an entity are as follows:

1 The increase in the variety and number of such entities;

2 The growing tendency of multiwordedness of names of such entities; and

3 The incidence of near-homonymous and alternative names of such entities.

Due to the above factors, the proportion of cases in which a multiworded name may be recalled correctly is decreasing. One approach to a solution may take the form of provision of cues in the catalogue that can aid the reader in calling back to memory the different components in the name and identify it correctly, starting from one or a few of the words in the name. Such a cue has to be a word or word-group having the highest recall value -- that is, having the highest potency of being called back to memory by the majority of the readers. In relation to a particular reader, a name of subject correlating with his field of interest may form such a cue. The above findings about the deep psychology of human memory, learning, and recall have led to the formulation of the Canon of Recall Value. It is the principle that in the multiworded name of an entity, the entry element is to consist of the word or word-group with the highest Recall Value. (7,8).

2 CONFLICT **AMONG THE CANONS**

The Canon of Recall Value governs the formulation of the rules for determining the entry element in the multiworded name of an entity. But it may come into conflict with other canons -- such as, the Canon of Ascertainability and the Canon of Prepotence. An examination of the cases in which a conflict arises, has suggested that the Canon of Prepotence, and not the Canon of Ascertainability, should govern the determination of the entry element in a name-of-person. The application of the Canon of Prepotence involves statistical analysis. Such an analysis was done by S R Ranganathan in respect of the Asian names in 1953 on the request of the Committee on Bibliography of Unesco. In the case of a name-of-organ of a government, it is difficult to use the Canon of Prepotence; but the Canon of Recall Value is of help. In the case of a name-of-institution, and of a name-of-conference also, the Canon of Prepotence fails. Further, the Canon of Recall Value also has difficulties. These difficulties centre round the nature of the substantive words or word-groups constituting the name of an institution or of a conference. They are analysed into six categories as follows:

1 The word or word-group indicating a subject forming the purview of the entity concerned;

2 The word or word-group indicating a class of persons or a class of corporate bodies forming the purview of the entity concerned;

3 The word or word-group indicating the nature of research or investigation forming the purview of the entity concerned;

4 The word or word-group indicating the dominant traditional sphere of work cum the corporate nature of the entity concerned;

5 Fanciful word or word-group, such as the name of a person not forming the purview of the entity concerned; and

6 A multiworded name, not admitting of a word or word-group of any one of the kinds mentioned in categories 1 to 5 above.

The Canon of Recall Value can be helpfully applied to the categories 1 to 5. But in the case of category 6, it fails and the Canon of Ascertainability takes over (26).

3 IMPLICATION OF THE CANON OF RECALL VALUE

31 Catalogue as an Externalised Memory

As an externalised memory, a library catalogue should be able to

1 Predict the appropriate cue for the name of an entity by which a reader may approach a catalogue; and

2 Display, in the context of the cue chosen, the necessary and sufficient visual aids to help exact recall.

32 Concern of the Canon of Recall Value

The Canon of Recall Value can endow the library catalogue with the qualities of such an externalised memory. It is concerned with the formulation of individual rules for the rendering of headings of entries for effectively responding to queries about documents already "known" to a reader. An entry for a known document should respond to a query about the documents, which uses either

1 The full name of any one of its attributes correctly; or

2 The word or word-group having the highest recall value among the words constituting the name of that attribute.

The choice of the word or word-group with the highest recall value should also be governed by the need for the reduction of search range in the library catalogue.

33 General Implications of the Canon of Recall Value

In the context mentioned above, the Canon of Recall Value implies, in general, the need of formulating the following:

1 An objective method of determining the word or word-group with the highest recall value;

2 Each individual rule prescribing the entry element indicating definitely the word or word-group to be deemed to be the entry element in a particular situation; and

3 An objective method of resolving the conflict, if any, of entry element.

34 Problem of Determining the Entry Element

In the context of the general implications mentioned above, the problems of determining the entry element in the multiworded names of the following entities have been investigated:

1 Names of Corporate Bodies -- that is, Government, Near-Sovereign Body, Quasi-Government, Institution, and Conference (4);

2 Names of Documents -- that is, titles of books and of periodical publications (5); and

3 Names of Publisher's series (3).

35 Pertinent Point-of-View

The investigation mentioned in Sec 34 has been done from the following points-of-view:

1 The nature of words or word-groups constituting the name of the entity concerned;

2 The relative distribution of recall value among the varieties of words;

3 The rules for determining the entry element;

4 Examples demonstrating the application of the rules; and

5 Evaluation of the existing pertinent prescriptions of CCC and AACR.

36 Names of Entities with Multiple Purview

In the context of the general implications of the Canon of Recall Value the problems of determining the entry element in the multiworded name of an entity with multiple purview have been investigated with emphasis on the factors to be considered in finding out a comparatively more effective method for this purpose (2).

4 RULE FOR RENDERING A MULTIWORDED NAME

A set of rules with illustrative examples, for rendering the multiworded names of each of the following entities has been formulated on the basis of the results of the investigation on the implications of the Canon of Recall Value:

1 Whole Government (14);
2 Whole Near-Sovereign Body (16);
3 Whole Quasi-Government (17);
4 Whole Institution (15);
5 Whole Conference (13);
6 Organ-of-Government (19);
7 Organ-of-Near Sovereign Body (21);
8 Organ-of-Quasi Government (22);
9 Organ-of-Institution (20);
10 Organ-of-Conference (18);
11 Book (Title) (10);
12 Publisher's Series (12);

13 Periodical Publication (Title)(23); and
14 Entities with Multiple Purview (11).

41 Seminar on Cataloguing

A seminar on Cataloguing was held in DRTC in May 1970. It was attended by 36 participants from different parts of India. The new situation created by the formulation of the Canon of Recall Value and the changes made necessary in some of the cataloguing rules, formed the main theme of the Seminar. It was based on a Working Paper consisting of 18 chapters developed by A Neelameghan and G Bhattacharyya (25).

These chapters may be grouped into four parts. The first part deals with the treatment of Conflict of Authorship in a Cataloguing Code (Chap BB). The second part deals with the basis of the Canon of Recall Value and with its implications on the rules for rendering multiworded name (Chap BC). The third part furnishes the rules for rendering multiworded name -- such as, name of different kinds of Corporate Bodies and of Publisher's Series, and Titles of documents -- formulated in conformity with the Canon of Recall Value (Chap BD to BS)(See Sec 4 above). The fourth part deals with the use of the Principle of Osmosis in implementing the changes in a library catalogue necessitated by the changes in the Catalogue Code (Chap BT)(See Sec 5 below).

5 CHANGE IN THE LIBRARY CATALOGUE

Re-thinking in the field of Cataloguing is overdue. The developments in the universe of documents would call for, in future, further investigations, and new formulations in the theory and practice of cataloguing. This is a never-ending cycle. The changes in the theory of cataloguing, and in the codes for cataloguing call for the implementation in the library catalogue the new prescriptions. An investigation in this area has shown that the use of the Principle of Osmosis secures maximum economy in implementing in the library catalogue the changes in the rules of the cataloguing code (9).

6 READERS' REACTION

The potential value of the Canon of Recall Value in rationalising the determination of the entry element in the multiworded names was realised and accepted by the participants of the DRTC Seminar on Cataloguing (See Sec 41). During the Seminar an appeal was made to the participants to design experiments in their respective libraries to examine the helpfulness to readers of rendering multiworded names in accordance with the rules formulated on the basis of the Canon of Recall Value. Some methods of survey of readers' reaction were also outlined. The survey has been carried out in the following institutions:

1 School of International Studies, J N University, New Delhi (Survey by Mrs Chaya Devi. Librarian: Shri Girja Kumar).

2 University of Poona (Survey by Shri S G Mahajan and Shri D W Shewde. Librarian: Shri K S Hingwe).

3 National Aeronautical Laboratory, Bangalore (Survey by Shri T Ranganathan. Scientist (Library): Shri M N Seetharaman).

The findings of these surveys confirm that the majority of readers prefer the rendering of multiworded names in accordance with the rules formulated on the basis of the Canon of Recall Value (6).

7 CRITICAL AND COMPARATIVE STUDY OF CATALOGUING CODES

The research project on the critical and comparative study of the Classified catalogue code (=CCC) and the Anglo-American cataloguing rules (=AACR) has been continued in 1970. Work under this project has been concerned with two specific areas as follows:

1 Treatment of conflict of authorship in cataloguing codes, in general; and

2 Conflict of authorship centring round corporate body *vs* corporate body.

71 Treatment of Conflict of Authorship

The prepearation of an entry consists of a few well-recognised unit operations -- such as, choice rendering, and recording. The principle of Unity of Idea demands that an individual rule in a cataloguing code should be concerned with one and only one unit operation. The Resolution of a conflict of Authorship is to be recognized as another unit operation in cataloguing work. A conflict of authorship centres round the question "Who is the author?" It is the responsibility of the definition of the term 'Author' to answer this question. Therefore, in a cataloguing code, a conflict of authorship is to be resolved at the level of definition of terms. In the light of the criterion mentioned above, the approaches of the different editions of CCC and AACR in regard to the resolution of the conflict of authorship have been critically examined (24).

72 The Conflict "Corporate Body vs Corporate Body"

A conflict of authorship should get resolved at the stage of the definition of the term 'Author' and of the terms denoting the different kinds of author. In the case of the conflict "Corporate Body vs Corporate Body", each of the initial formal definition requires to be propped up by one or more appropriate interpretative definitions as a sequel to it. Many of the cataloguing codes do not give such interpretative definitions. But they are implied in their rules for choice and rendering of heading; and they can be distilled out of these rules.

A critical and comparative study of how the Rules for dictionary catalogue of Cutter and the different editions of CCC and AACR resolve the conflict "Corporate Body vs Corporate Body" has been done on the basis of the relevant interpretative definitions -- either explicitly stated or distilled out from the rules implying them. Conflicts centring round the following kinds of Corporate Bodies have been considered:

1 Government;
2 Near Sovereign Body;
3 Quasi Government;
4 Institution; and
5 Conference.

In relation to each kind, a system of precise terminology has been developed on the basis of which the different issues have been systematically discussed. The specific issues considered generally in relation to each kind of Corporate Body are:

1 Whole Corporate Body vs its Organ of Remove 1;
2 Organ of Remove 1 vs Organ of Remove 2;
3 Corporate body vs its Quasi Independent Institution;
4 Corporate Body vs its Organ Conference; and
5 Corporate Body as a Delegated-from-Body vs Conference.

Impact, if any, received by any code from the earlier codes has been indicated. Whenever necessary, the interpretative definitions for inclusion in CCC (Ed 6) have been given (27).

8 POSTULATE-BASED SUBJECT PROFILE

SDI system takes the responsibility of selecting pertinent references to documents for each of its users. Thus it becomes necessary for the system to maintain a file of subject profiles for its users. To satisfy a specific subject query, the system is to provide references to the

1 Documents exclusively devoted to the specific subject;

2 Documents embodying subjects of greater extension than that of the specific subject but having a substantial portion devoted to it;

3 Documents embodying subjects of extension smaller than that of the specific subject but dealing with some facet of it; and

4 Documents on collateral subjects which contain some information, though indirectly, on the specific subject.

The subject heading reached at Step 5, "Transformed Title in Kernel Terms", according to the postulational method of classifying prescribed by S R Ranganathan specifies the subject of the document coextensively. It uses the postulates, canons, and principles for the idea and verbal planes only, and it is independent of those for the notational plane. These subject headings, after being arranged alphabetically, reflect the mutual relations -- such as, superordinate, subordinate, and collateral relations -- among the subjects. The selection of references pertaining to a subject of interest to a reader at the moment, is to be done by matching each of the subject profiles with the subject entries for documents.

This shows that specification of the subjects of interest in the subject profiles for users and the determination of subject headings for documents should be based on the same set of postulates, canons, and principles. According to this suggestion, the construction of subject profiles for users on the basis of the set of postulates, canons, and principles enunciated by S R Ranganathan, has been demonstrated with concrete illustrative examples (1).

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3 Sec 34 --. Rendering of name of publishers in heading. (Annual seminar, (DRTC). 8; 1970; Paper AE).

4 Sec 34 --. Rendering of names of corporate bodies in headings. (Annual seminar, (DRTC). 8:1970; Paper AC).

5 Sec 34 --. Rendering of titles in headings. (Annual seminar, (DRTC). 8;1970; Paper AD).

6 Sec 6 CORPORATE BODY (Rendering of name of —); readers' reaction. (Annual seminar, (DRTC). 8;1970; Paper AG).

7 Sec 1 NEELAMEGHAN (A) and BHATTACHARYYA (G). Basis for the canon of recall value. (Annual seminar, (DRTC). 8;1970; Paper AB).

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14	Sec 4	-- and --. Rendering of the name of a whole government. (In Cataloguing (Seminar on —)(Bangalore)(1970). Working paper and proceedings. 1970. Chap BD).
15	Sec 4	-- and --. Rendering of the name of a whole institution. (In Cataloguing (Seminar on —)(Bangalore) (1970). Working paper and proceedings. 1970. Chap BG).

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26 Sec 2 RANGANATHAN (S R). Conflict of canons of cataloguing. (Annual seminar, (DRTC). 8;1970; Paper AA).

27 Sec 72 -- and BHATTACHARYYA (G). Conflict of authoship: Corporate body vs corporate body. (Library science. 7; 1970; Paper G).

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COMPUTER-AIDED DOCUMENT FINDING SYSTEM.

(DRTC Research Cell, report (1970) 3).

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1 INTRODUCTION

This is a technical report of the work done in DRTC in 1970, on the development of a computer-aided document finding system.

2 OBJECTIVE: INTEGRATED SYSTEM

Since the middle of 1968, experiments on the feasibility of using a general purpose computer in a document finding system based on a classified catalogue system using freely faceted depth versions of the Colon Classification, have been carried out. The results of this experimental work have been reported in 1969 (1). The main objective of the work during 1970 has been to develop a complete document finding system into which the computer facility can be integrated at different stages according to need, viability in a given context, etc.

3 PROGRAM-PACKAGE

Keeping the objective mentioned in Sec 2 in view, a program-package, containing fifteen programs, has been developed (2, 4). The system provides for:

1 Retrospective search for entries of documents relevant to a reader's query in a Catalogue-on-Tape;

2 SDI service;

3 Reader's approach to selection of documents by name of subject, author, collaborator, series, etc;

4 Reader Profile Catalogue in which the subject of interest to the reader may be in the form of Class Number, or Feature Heading only, or Class Number and Feature Heading;

5 Acceptance of reader's query about a subject in the form of Kernel Terms in random sequence;

6 Replacement of non-standard terms, if any, in the query, by standard terms in the classification schedules through a built-in thesaurus of a special kind;

7 Rearrangement of the Kernel Terms of a subject in the facet structure sequence using schedules in which the kernel ideas are arranged in a special way;

8 Synthesis of Class Number for subject of document or of query using Colon Classification;

9 Translation of Class Number into Kernel Terms to form Feature Heading;

10 Direct reader-computer "dialogue";

11 Browsing in the output documentation list among its classified entries fitted with adequate Feature Headings;

12 Alphabetical Index to the subjects etc in the output documentation list;

13 Different formats of Main Entry in the output;

14 Output on line-printer, punched card, and magnetic tape;

15 Updating the Catalogue-on-Tape, the Catalogue of Reader Profile-on-Tape, and the Classification Schedules-on-Tape; and

16 Guidance by computer to help reader use the system.

4 FEATURE HEADING AND CLASS INDEX HEADING

A schedule look-up procedure for the translation of Colon Class Number into the standard terms of the schedules to form a Feature Heading by a computer, forming one of the items in the program package, has been described in some detail (3). Methods by which the computer can recognise a devised isolate number, and an unsought link, have been worked out. A procedure for preparing cyclically permuted Class Index Headings has been formulated.

5 COMPUTER AND PROGRAM LANGUAGE

In our earlier experiments, an ICL 1903 computer was used. The programs were written in PLAN language. All the programs in the program-package have been written in Autocoder Language for the

IBM 1401 computer. All the programs, excepting DIALOG and GUIDE have been tested. These two programs are to be tested further and debugged.

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3 Sec 4 --. Preparation of feature heading and class index heading using computer. (Lib sc. 7;1970; Paper R).

4 Sec 3 NEELAMEGHAN (A) and GUPTA (B S S). An user-oriented computer-based system for document finding. (Documentation (International Congress of —.) (1970)(Buenos Aires)).

32 PROJECT 2

Project 2, to be completed within six months after the formal course in DRTC, consists of the preparation of a Trend Report on an approved specific subject based on the survey of the current documents on the subject appearing in various periodicals, reports, etc.

4 DURATION

The formal course commences on 15 April every year and continues till 14 June the following year.

5 ADMISSION

A candidate seeking admission to the course should ordinarily possess any one of the following minimum basic academic qualifications :

1 Post-graduate Degree or Diploma in Library Science.

Or

2 MA/M Sc or an equivalent degree or a degree in Engineering, Technology, Agriculture, Animal Husbandry, or Medicine, and practical experience in Documentation.

Admission to the course is strictly based on the merit of a candidate as judged by his academic record, and if necessary, performance in a special admission test held for the purpose or a personal interview by a selection committee.

6 AWARDS FOR PROFESSIONAL ATTAINMENTS

1 Associateship in Documentation on the basis of examination and the report of professional work in DRTC ; (The Associateship is declared equivalent to the M Lib Sc degree by the Government of India).

2 Associate Fellowship in Documentation on the basis of report/thesis of research work done in DRTC ;

3 Fellowship in Documentation for outstanding contributions and published works in the field of documentation.

7 RESEARCH FELLOWSHIP

Some research fellowships are available to pursue advanced work in DRTC. There is also provision for research follows to work with Dr S R Ranganathan, National Research Professor in Library Science, and Hon Professor, DRTC.

A practising documentalist will be provided facilities to reside in DRTC for a specific period to pursue a specific line of research in the field of documentation.

8 PUBLICATIONS

1 *Library science with a slant to documentation*, a quarterly published in collaboration with the Sarada Ranganathan Endowment for Library Science ; and

2 Proceedings of the DRTC Seminars.
(*See also* back of half-title page)